

# Service Manual

Color Video Monitor

## CT-S1390Y

G15M Chassis



The service technician is required to read and follow the "Safety Precautions" and "Important Safety Notice" in this service manual.

### Specifications

<b>Power Source:</b>	AC 120V, 60Hz	<b>Resolution:</b>	420 TV lines (Horizontal)
<b>MAX Amps:</b>	1.4A	<b>Dimensions:</b>	
<b>Picture Tube:</b>	13" Diagonal 90-degree deflection	<b>Width;</b>	14 <sup>3</sup> / <sub>8</sub> " (365 mm)
<b>Speaker Output:</b>	1.5W (10% THD)	<b>Depth;</b>	15 <sup>15</sup> / <sub>32</sub> " (393 mm)
<b>Video/Audio Terminals: (LINE A/LINE B)</b>		<b>Height;</b>	12 <sup>17</sup> / <sub>32</sub> " (318.5 mm)
<b>Video Input;</b>	1.0Vp-p, 75Ω or High impedance (Auto), BNC type connector	<b>Weight:</b>	28.2lbs. (12.8kg)
<b>Video Through Out;</b>	Automatic Termination Opener, BNC type connector	<b>Operating Temperature:</b>	32°F~95°F (0°C~+35°C)
<b>Audio Input;</b>	0.5Vrms, 22kΩ or more, phono type connector	<b>Operating Humidity:</b>	20%~80% (without dew on the surface of each parts)
<b>Audio Through Out;</b>	Phono type connector	<b>Safety Regulations:</b>	UL1410 Listed
<b>S-Video Input;</b>	Y signal 1.0Vp-p, C signal 0.285Vp-p, 75Ω or High impedance (Manual), MINI DIN 4P type connector	<b>EMC Regulations:</b>	Complied with FCC rules, Part 15
<b>S-Video Output;</b>	Y signal 1.0Vp-p, C signal 0.285Vp-p, 75Ω or High impedance (Manual), MINI DIN 4P type connector		

Specifications are subject to change without notice.  
Weight and dimensions shown are approximate.

# Panasonic®

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**⚠ WARNING**

This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

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- **PRODUCT COMPLIES WITH DHHS RULES 21 CFR SUBCHAPTER J IN EFFECT AS OF DATE OF MANUFACTURE.**

### IMPORTANT SAFETY NOTICE

There are special components used in Panasonic Monitor sets which are important for safety. These parts are shaded on the schematic diagram. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent X-RADIATION, shock, fire, or other hazards. Do not modify the original design without permission of PANASONIC BROADCAST & TELEVISION SYSTEMS COMPANY.

## Safety Precaution

### GENERAL GUIDELINES

1. It is advisable to insert an isolation transformer in the AC supply before servicing a hot chassis.
2. When servicing, observe the original lead dress, especially the lead dress in the high voltage circuits. If a short circuit is found, replace all parts which have been overheated or damaged by the short circuit.
3. After servicing, see to it that all the protective devices such as insulation barriers, insulation papers, shields, and isolation R-C combinations, are properly installed.
4. Before turning the monitor on, measure the resistance between 130V line and hot side ground (TP92), between B+ line and cold side ground (TPA5). Connect the  $\ominus$  side of an ohmmeter to the B+ lines, and the  $\oplus$  side to ground (TPA5). Each line should have more resistance than specified, as follows:

B+ Line	Minimum Resistance
130V (TP91)	10k $\Omega$
5V (TPA2)	500 $\Omega$
9V (TPA3)	500 $\Omega$
11.1V (TPA6)	500 $\Omega$
17.3V (TPA7)	500 $\Omega$
24.5V (TPA8)	2k $\Omega$
186V (TPA10)	100k $\Omega$

5. When the monitor is not used for a long period of time, unplug the power cord from the AC outlet.
6. Potentials, as high as 24.5kV $\pm$ 1.5kV are present when this monitor is in operation. Operation of the monitor without the rear cover involves the danger of a shock hazard from the monitor power supply. Servicing should not be attempted by anyone who is not thoroughly familiar with the precautions necessary when working on high voltage equipment. Always discharge the anode of the picture tube to chassis ground before handling the tube.
7. After servicing, make the following leakage current checks to prevent the customer from being exposed to shock hazards.

### LEAKAGE CURRENT COLD CHECK

1. Unplug the AC cord and connect a jumper between the two prongs on the plug.
2. Turn on the monitor's power switch.
3. Measure the resistance value, with an ohmmeter, between the jumpered AC plug and each exposed metallic cabinet part on the monitor, such as screwheads, connectors, control shafts, etc.

When the exposed metallic part has a return path to the chassis, the reading should be more than 1M $\Omega$ .

When the exposed metal does not have a return path to the chassis, the reading must be  $\infty$ .

### LEAKAGE CURRENT HOT CHECK (See Fig. 1)

1. Plug the AC cord directly into the AC outlet. Do not use an isolation transformer for this check.
2. Connect a 1.5 k $\Omega$ , 10 watt resistor, in parallel with a 0.15  $\mu$ F capacitor, between each exposed metallic part on the set and a good earth ground such as a water pipe, as shown in Fig. 1.
3. Use a high impedance AC voltage meter to measure the potential across the resistor.
4. Check each exposed metallic part, and measure the voltage at each point.
5. The potential at any point should not exceed 0.75 volts RMS. A leakage current tester (Simpson Model 229 or equivalent) may be used to make the hot checks, leakage current must not exceed 500 $\mu$ A. In case a measurement is outside of the limits specified, there is a possibility of a shock hazard, and the monitor should be repaired and rechecked before it is returned to the customer.

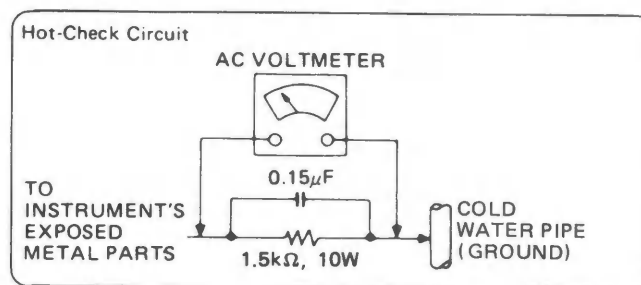


Fig. 1

## X-RADIATION

**WARNING:1.** The potential source of X-Ray Radiation in monitor set is the High Voltage section and picture tube.

2. When using a picture tube test jig for service, make sure that the jig is capable of handling 26.0kV without causing X-Ray Radiation.

**NOTE:** It is important to use an accurate, periodically calibrated high voltage meter.

## High Voltage Check

1. Set the line voltage to 120V AC and turn the unit on after connecting high voltage meter to the unit.
2. Select the Video Line A input and receive monoscope pattern.
3. Adjust Sub-Bright and Sub-Contrast until the picture is black.
4. Measure the High Voltage. The meter (electrostatic type) reading should indicate  $24.5\text{kV} \pm 1.5\text{kV}$ . If the meter indication is out of tolerance, immediate service and correction is required to prevent the possibility of premature component failure.
5. To prevent an X-Radiation possibility, it is essential to use the specified picture tube.

## Radiation Safety Circuit Test

This test must be made as a final check before the set is returned to the customer.

- (1) Connect DC amperemeter to TPD1 (+) and TPD2 (-).
- (2) Connect Electrostatic high voltage meter between the CRT anode and chassis ground for measuring high voltage.
- (3) Set AC line to 120V/60Hz, and apply a monoscope pattern at the line B, adjust BRIGHT and CONTRAST customer controls to obtain  $700 \pm 100\mu\text{A}$  indication on DC amperemeter.
- (4) Turn chassis off, and short R802 with a short jumper.
- (5) Set AC line to about 80 volts, and turn chassis on. Slowly increase the AC line voltage until the start point of lose of H-SYNC on the picture and check that the beam current and the high voltage is A or B in Table 1 at the point.
- (6) Turn chassis off and remove a short jumper.

**Table 1**

	Beam Current ( $\mu\text{A}$ )	High Voltage (kV)
A	400~600	not exceeding 28
B	601~800	not exceeding 27.6

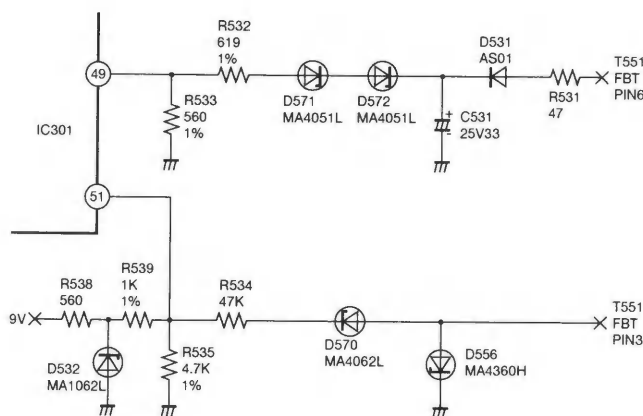
## Circuit Explanation

### HORIZONTAL OSCILATOR DISABLE CIRCUIT

To monitor the high voltage, the positive DC voltage from the cathode of D531 is applied through zener diode D571 and D572 and divided by R532 and R533 to pin 49 of IC301, which is the input terminal of the X-Ray Protection Circuit. Under normal conditions, this voltage is insufficient to activate the X-Ray Protection Circuit.

If the high voltage increase over the specified voltage, the voltage at the pin 49 of IC301 increases and causes the horizontal oscillator frequency to increase, loss of horizontal synchronization and lowering of the high voltage.

In the process described above, the voltage at the pin 49 of IC301 is compared with the voltage at pin 51 of IC301 which is basically a constant voltage fed from the zener diode D532, divided by R539 and R535. If excessive beam current is drawn, the lowered voltage is fed to pin 51 of IC301 through zener diode D570 and R534 to aid operation of the X-Radiation Protection Circuit.

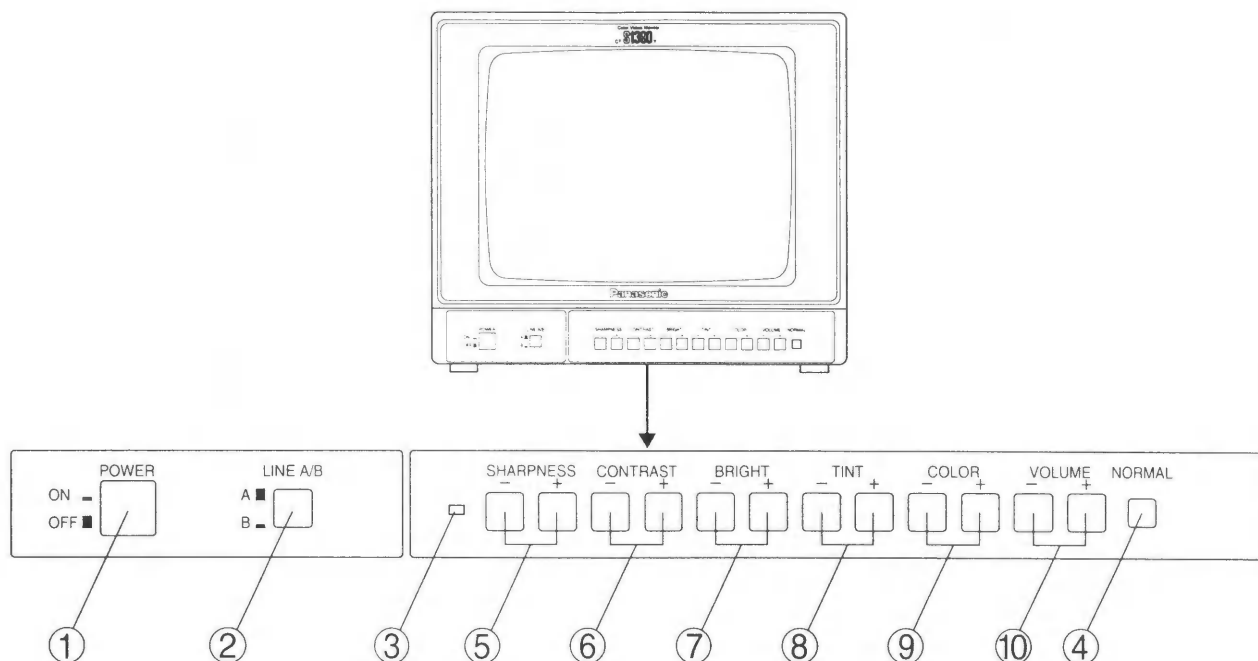


**Fig. 2**

# Operation of Front Panel Controls

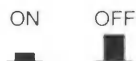
First, turn on the device connected to the monitor.

If the monitor does not light up, it means that the signal is not being input to it.



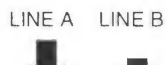
## ① Power Switch

Power ON/OFF.



## ② Input Selector

This switch is used to select one of the two signal inputs (LINE A and LINE B).



## ③ Operation Indicator

- This indicator lights up when the power is ON.
- This indicator flashes while you are pressing the +/- buttons on one of the controls, and lights up when the control value in question reaches Min./Max.
- This indicator flashes twice when the Normal Button is pressed.

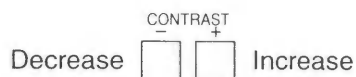
## ④ Normal Button

This button is used to return the picture control level to the factory set mid values.

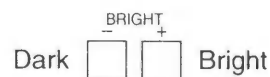
## ⑤ Sharpness Control



## ⑥ Contrast Control



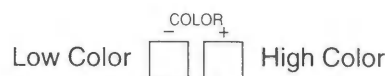
## ⑦ Brightness Control



## ⑧ Tint Control



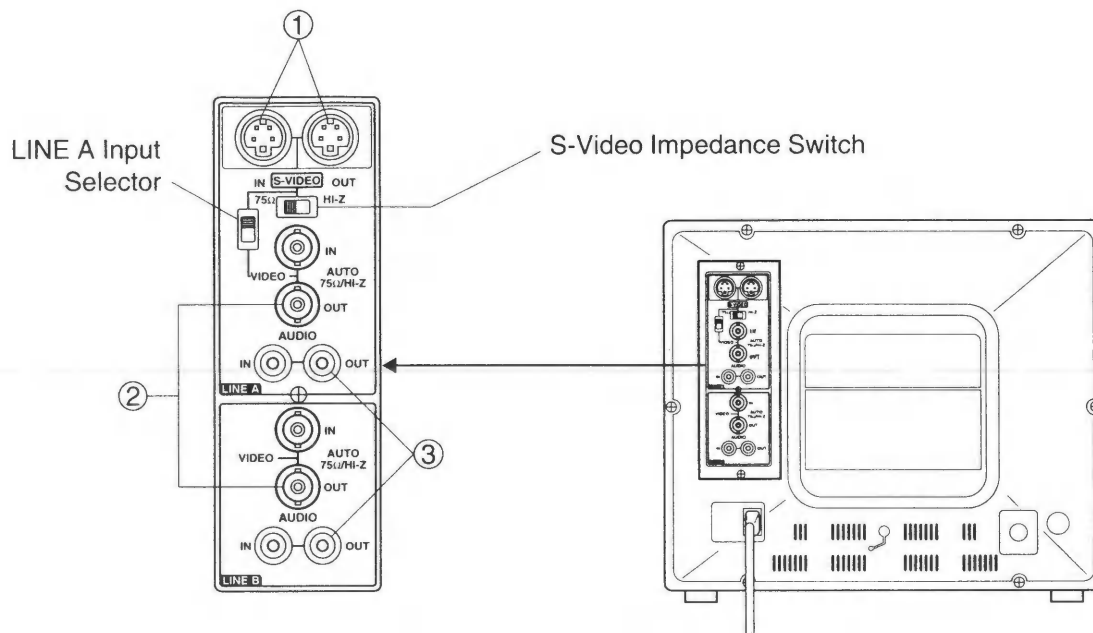
## ⑨ Color Control



## ⑩ Volume Control



# Rear Terminals

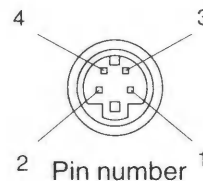


Signals received		Switches	Input Selector (LINE A/B at front panel)	LINE A Input Selector (at rear terminals)
LINE A	S-Video			
	Video			
LINE B	Video			

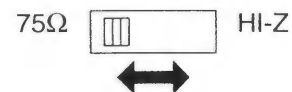
## ① S-Video Input/Output Terminal (4 pin)

These are the luminance signal and chroma signal input/output terminals.

When connecting the output terminal to another device, set the S-Video Impedance Switch to HI-Z, and set the Input Selector to the LINE A position.



Pin No.	Function
1	GND (Luminance)
2	GND (Chroma)
3	Luminance
4	Chroma



## ② Video Input/Output Terminals (BNC)

**Note:** To view the LINE A Video Input Signal (instead of S-Video), set the LINE A Input Selector at the bottom.

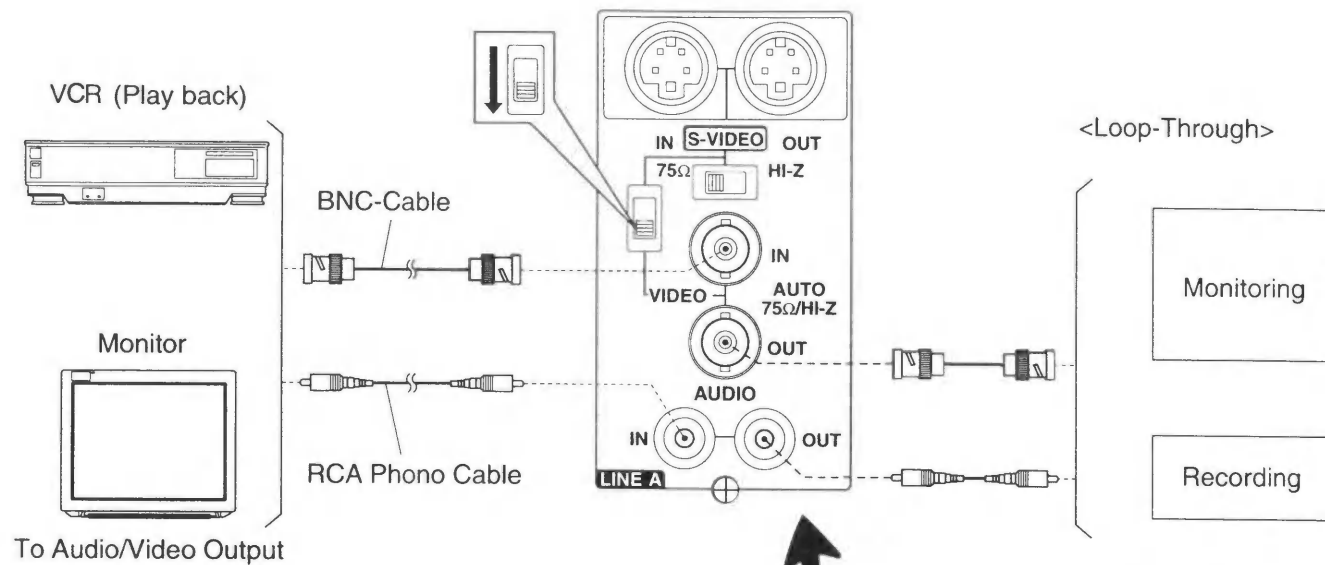
## ③ Audio Input/Output Terminals (RCA phono)

**Note:** The signal to each output terminal is supplied through each signal of LINE A or LINE B signal regardless of the setting position of the Input Selector or the LINE A Input Selector.

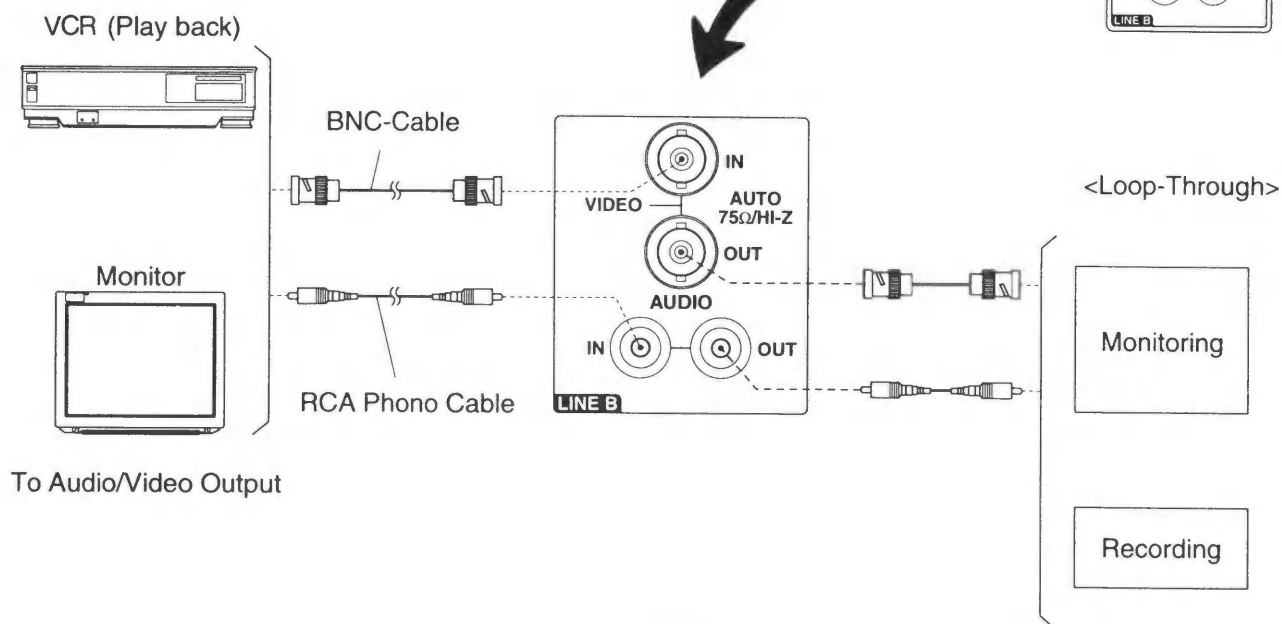
# Connections

## 1. Video (BNC) Terminal

### Line A

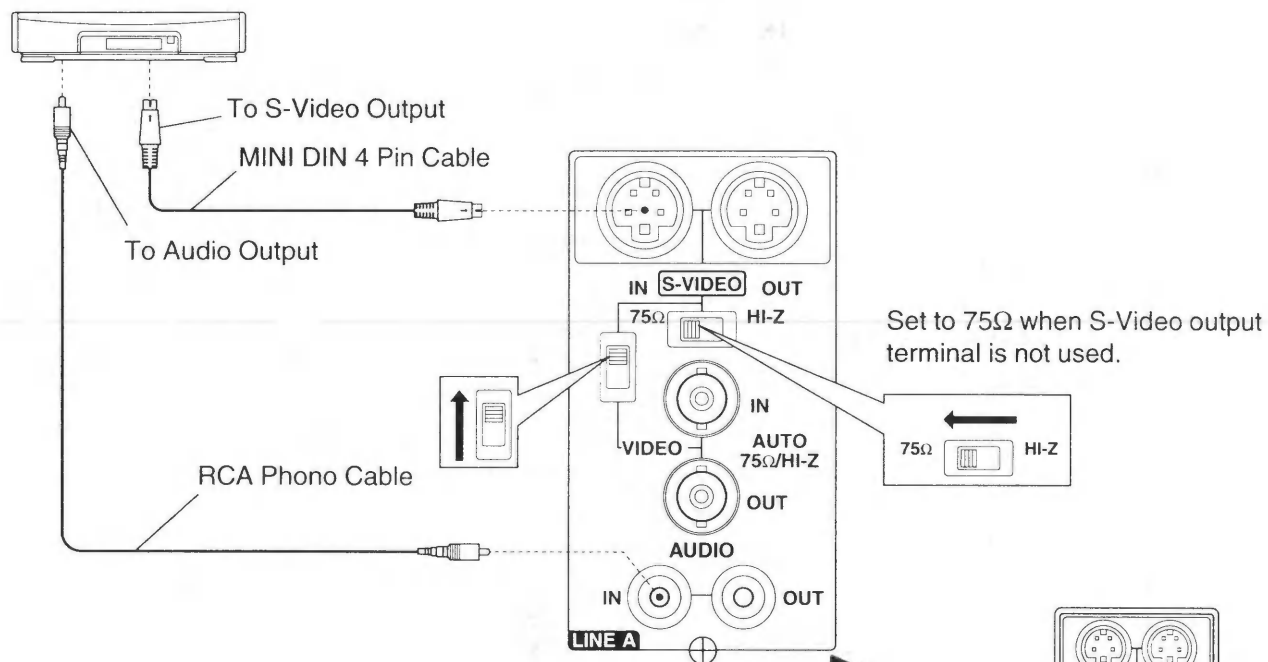


### Line B



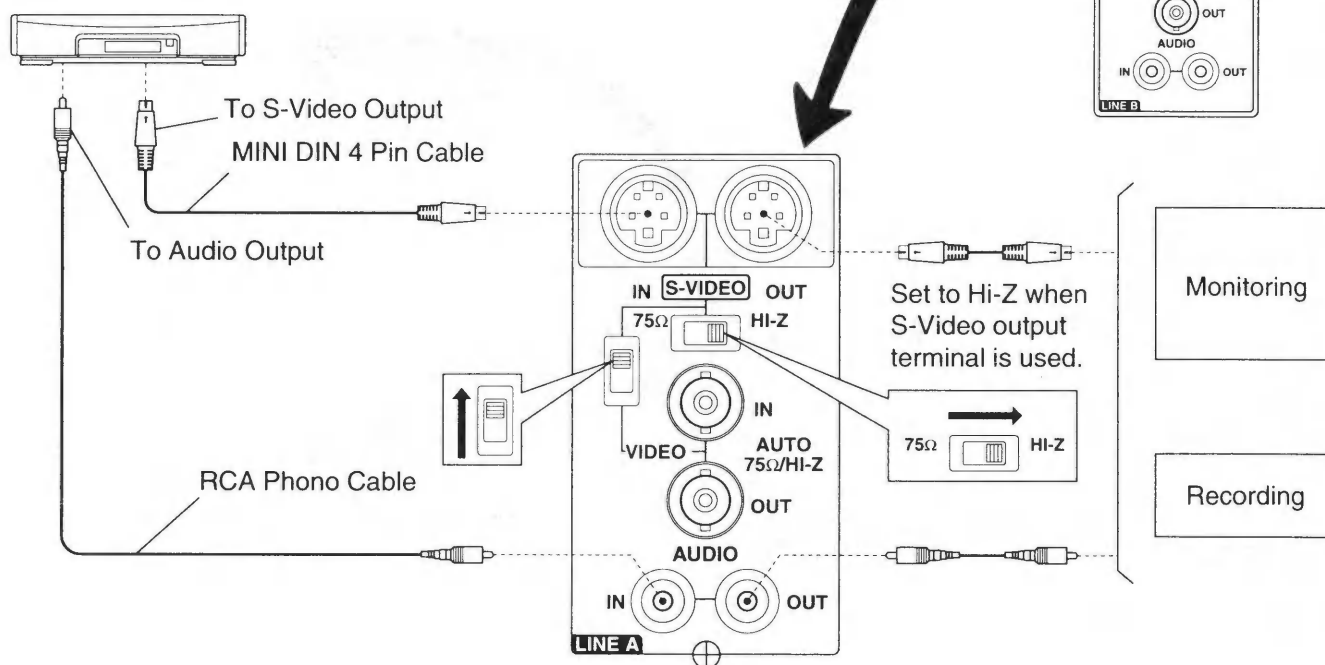
## 2. S-Video Terminal

VCR with S-VIDEO terminal



S-Video Loop-Through

VCR with S-VIDEO terminal





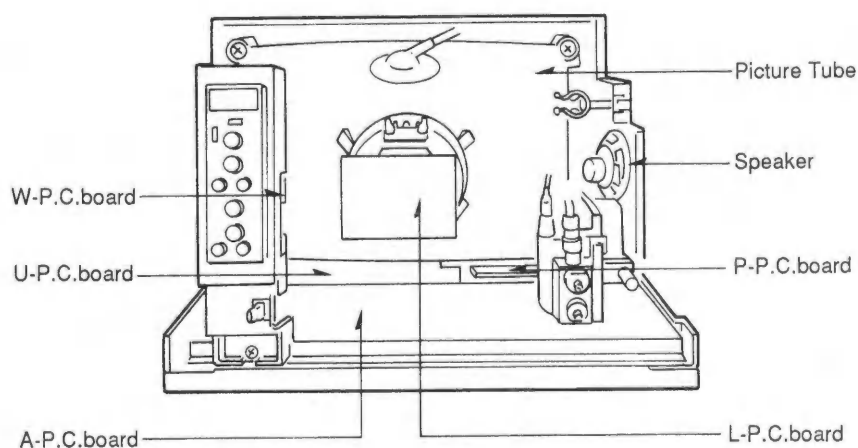
## Disassembly Instructions

### Warning:

1. Before disassembly, remove the AC plug from the wall outlet.
2. When turning over a P.C.board to adjust it, be sure to lay on insulating material under it in order to prevent shorting.
3. P.C.board and wires should not be pulled forcibly, but be handled carefully.
4. When removing the cabinet take care not to damage the neck of the picture tube.
5. P.C.boards and connectors should be handled with care-avoid handling them forcibly!
6. When handling the A-P.C.board with the power on, there is a risk of an electric shock if you use the COLD side heat sink while working on the HOT side of the chassis.

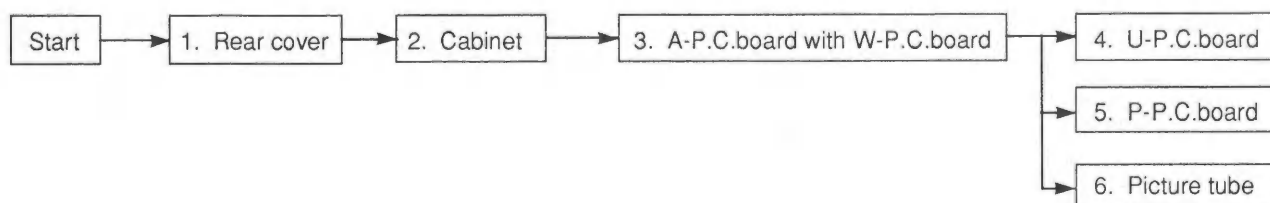
## CIRCUIT BOARD LAYOUT

(Rear View)



## DISASSEMBLY FLOWCHART

This flowchart indicates disassembly items of the cabinet parts and circuit boards in order to find the items necessary for servicing. When reassembling, perform the steps in the reverse order.



## DISASSEMBLY INSTRUCTION

### 1. Removal of Rear cover

1. Remove 9 screws(A).

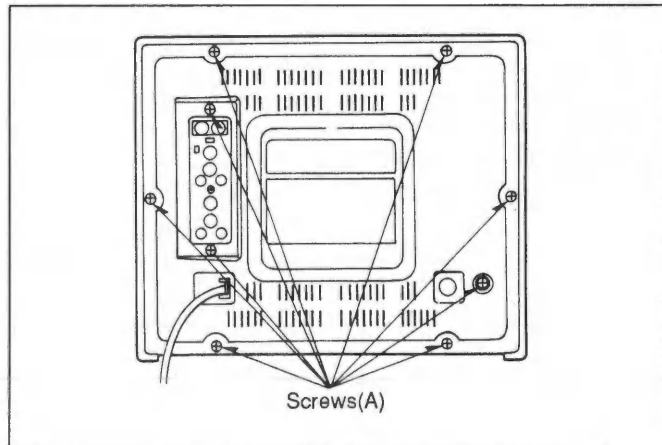


Fig.1

### 2. Removal of Cabinet

1. Remove 8 screws(B).  
(Right side:4, Left side:4)

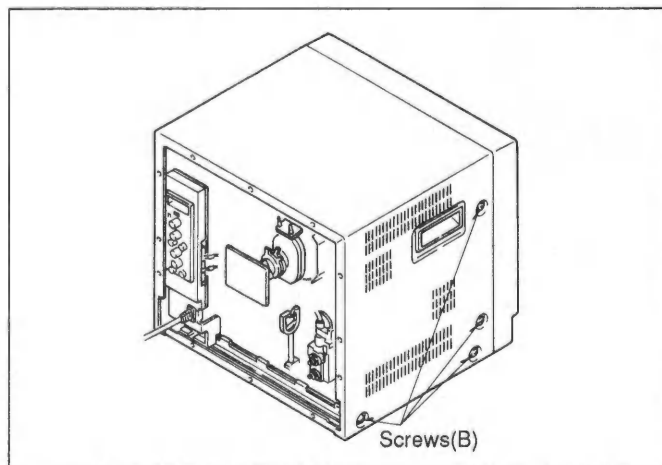


Fig.2

### 3. Removal of A-P.C.board with W-P.C.board

1. Remove 2 screws(C) of the frame.
2. Remove a screw(D) for earth.
3. Remove the DEG connector and clampers.
4. Slide the frame toward you.

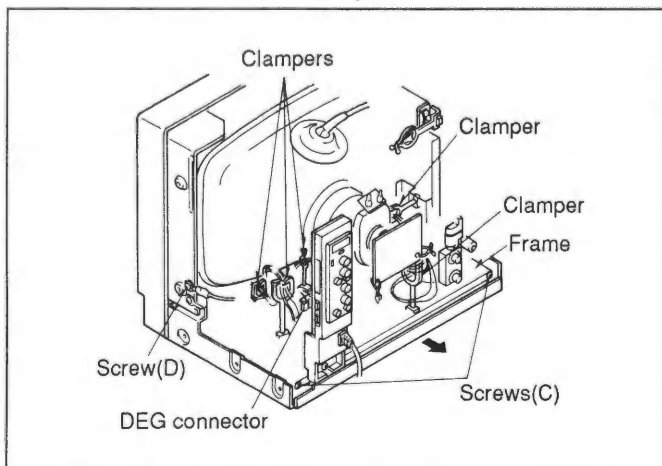


Fig.3

### 4. Removal of U-P.C.board

1. Remove 7 screws(E).

### 5. Removal of P-P.C.board

1. Remove 2 screws(F) as shown in fig.4.

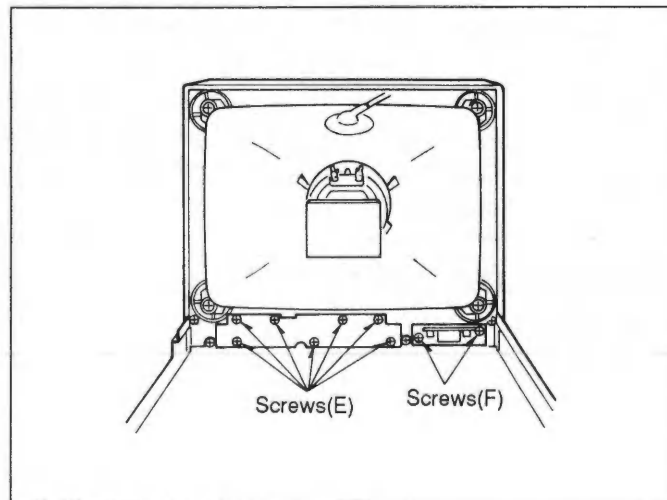


Fig.4

### 6. Removal of Picture tube

1. Remove the L-P.C.board and the deflection yoke.
2. Remove 4 screws(G).

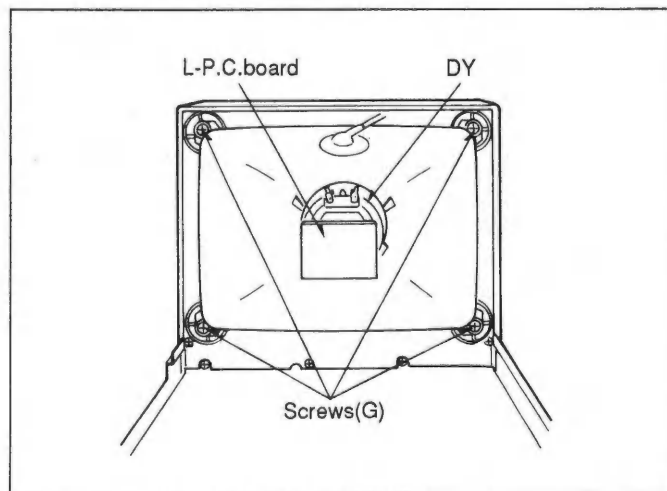


Fig.5

## Self Check Functions

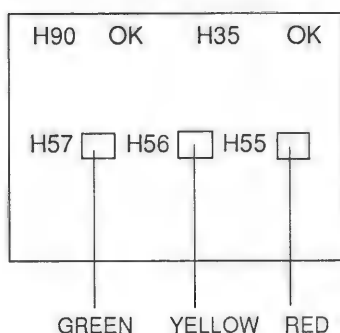
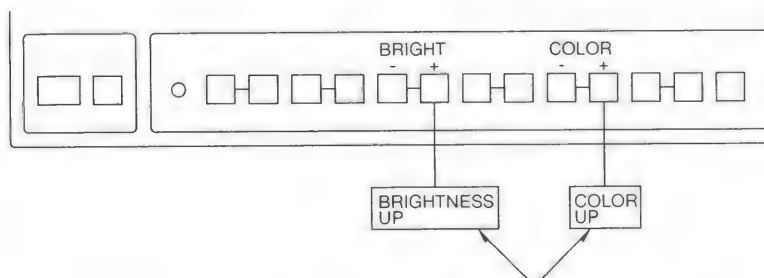
If you cannot confirm the "occasional power cut-off" symptom during servicing, **use** the self check function to determine whether or not this problem occurs.

### Method

Simultaneously press the "Color Up" and "Brightness Up" buttons on the front panel of the unit for approximately 2 seconds.



The Self Check panel will be displayed.



Item	Check Circuit / Component Name
H90	Communication abnormality between the microprocessor (IC001) and the memory (IC002).
H35	Communication abnormality between the microprocessor (IC001) and the video chroma jungle circuit (IC301).
H55	Abnormal detect of voltage or load on each positive voltage lines. The differences between the three displays depend on the differing voltage values in pin 19 (or TPA9) of IC001.
H56	
H57	H55 ... 3.7 V or more, H56 ... less than 3.6 V , H57 ... less than 2.3 V.

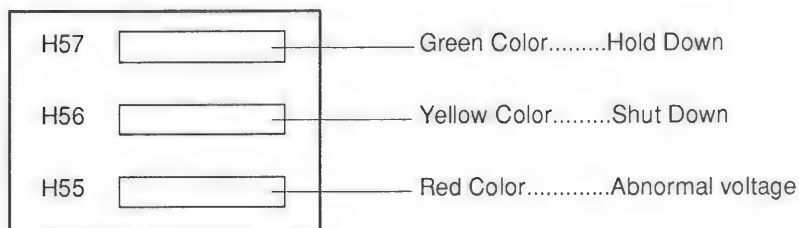
**Note:** There will be no display unless H55, H56 or H57 are abnormal.

### Cancel

Turn the power off. In this case the self check results will have to be reset.

### Display when "Power Off" occurs.

The screen color bar will be displayed when the protective circuit turns on because of excess current, excess voltage or abnormal voltage.



## Concerning Market Service Mode

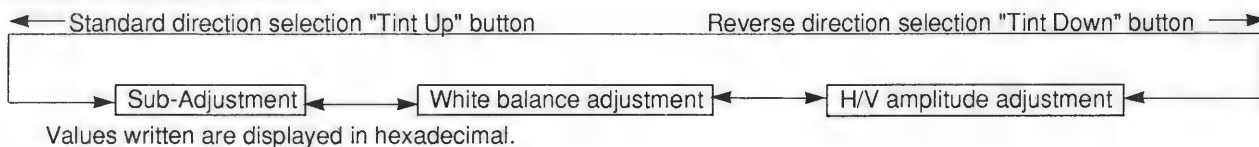
The unit has a market service mode by which various adjustments can be made through manipulating the buttons on the front panel.

Item Check Circuit / Component Name

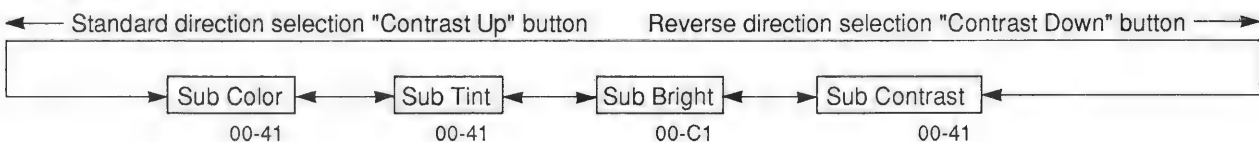
### Starting Market Service Mode

Press the "Color Up" and the "Sharpness Up" buttons on the front panel simultaneously for two seconds.

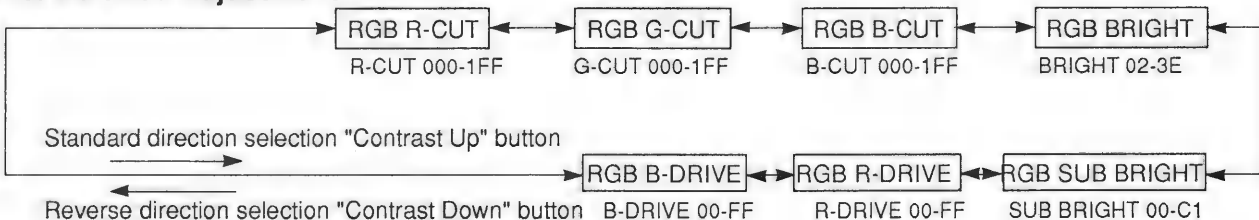
### Content of Market Service Mode



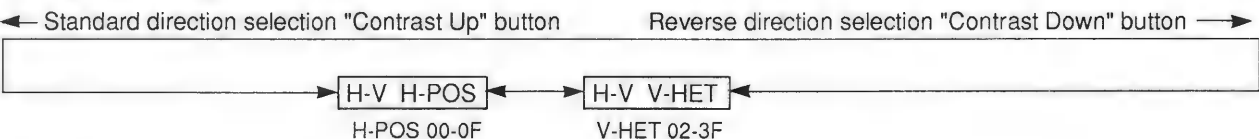
### Sub Adjustment



### White Balance Adjustment



### H/V amplitude adjustment



**Note:** Each adjustment is made using the Volume + / -.

### Caution:

The values (hexadecimal) preset in the market service mode differ between TV sets. For this reason when you enter the market service mode perform adjustment work after writing down the values of each item.

### When Adjusting the Market Service Mode is Necessary

#### Adjustment Always Necessary

- A. After the memory has been replaced.
- B. When the picture tube has been replaced.

#### Verify the Crosshatch Pattern and Adjust When Necessary

- A. After deflecting coil circuit components have been replaced.  
(for example the vertical output IC, the deflection yoke, the Q551 and the flyback transformer.

## Adjustment Method

### SUB Adjustment

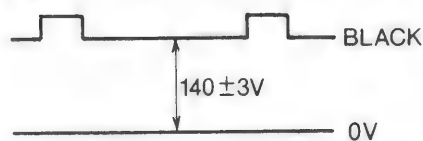
Adjustment is not necessary.

### White Balance Adjustment

1. Apply white balance pattern (with burst) at the LINE A (video).
2. Adjust R, G, B-Cut to OFF.
3. Apply the sub-bright adj. mode, and connect short jumper to TPS8-GND, and turn screen VR to fully counter-clockwise.
4. Observe TPKG by oscilloscope. Then adjust sub-bright so that the scanning period get  $140 \pm 3V$  DC. Remove the probe of oscilloscope.

Note: Adjust sub-bright in sub volume adj. mode.

(Sub-bright in white balance adj. mode can not last memory.)



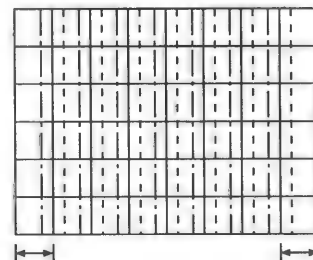
5. Turn screen VR to clockwise slowly and set it where first color is slightly appeared, and remove the short jumper.
6. Then make above low light to white by changing the data for R-cut and B-cut.
7. Obtain proper white balance by changing the data for R-drive and B-drive.
8. Place the light reception hood of the white balance meter on the CRT face glass.
9. Perform low-light adj. with the white balance meter switched to LO.  
( $9300^{\circ}K \pm 300^{\circ}K$ )
10. Perform high-light adj. with the white balance meter switched to HI.  
( $9300^{\circ}K \pm 300^{\circ}K$ )
11. Repeat the above two adj. item 9 and 10 to correct the low-light adj.
12. Low-light adj. shall be carried out last because low-light adj. has less effect on high-light adj. than vice-versa.

### H-V (Horizontal, Vertical Adjustment)

Initialize Condition: Receive the cross hatch pattern.

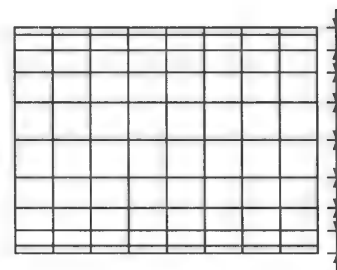
### H-POS (horizontal position) Adjustment

Press the Volume + / - buttons and adjust so that the vertical lines on the left and right of the cross hatch pattern are equidistant from the screen margins.



### V-HET (Vertical Amplitude) Adjustment

Press the Volume + / - buttons and adjust so that the vertical size of the cross-hatch pattern measures are the same (adjust so that they are the same as the horizontal line intervals).



# Measurements and Adjustments

## CAUTION FOR SERVICING

This model has the HOT and COLD section with the power supply section. Therefore following precautions are necessary.

1. Do not touch the HOT section and the COLD section at the same time. You may receive an electric shock.

Unless otherwise noted, a transformer core with two tuning peak points should be adjusted at the lower position as shown in below Fig. 1.

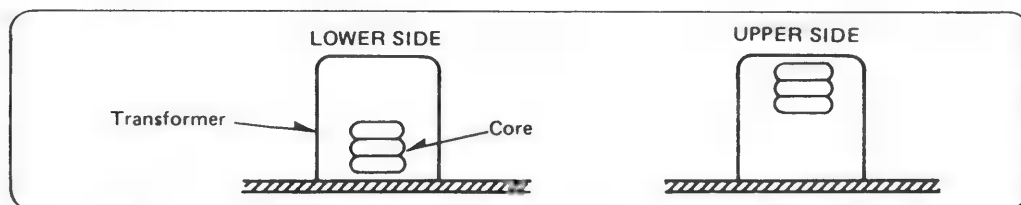


Fig. 1

## +B VOLTAGE ADJUSTMENT (A-P.C. board)

### 1. EQUIPMENT TO USED

Digital Voltmeter  
Tuner Unit.

### 2. ADJUSTMENT PROCEDURE

1. Set the Brightness and Contrast control to minimum, and delete the raster.
2. Connect a Digital Voltmeter between each +B points and the ground as shown in Table 1.
3. Confirm that the indicated measurement points for the specified voltage.

Table 1

+B Points	GND Points	Voltage
TP91	TP92 (HOT GND)	$130 \pm 2V$
TPA2	TPA5 (COLD GND)	$5 \pm 1V$
TPA3		$9 \pm 1V$
TPA6		$11.1 \pm 1V$
TPA7		$17.3 \pm 2V$
TPA8		$24.5 \pm 2V$
TPA10		$186 \pm 15V$

## PURITY ADJUSTMENT

### 1. EQUIPMENT TO USED

Video Generator  
External Degaussing Coil

### 2. ADJUSTMENT PROCEDURE

1. Operate the monitor over 30 minutes.
2. Fully degauss the picture tube by using an external degaussing Coil.
3. Set the Input Selector Switches to LINE A.
4. Input a cross hatch pattern to VIDEO input terminal.
5. Adjust roughly convergence by using the static and convergence magnets and deflection yoke.
6. Input a black and white signal to VIDEO input terminal.
7. Loosen clamp screw of the deflection yoke.
8. Slide the deflection yoke toward the picture tube by activating green only.
9. Adjust the purity magnets so that green bar is obtained at the center of the picture.

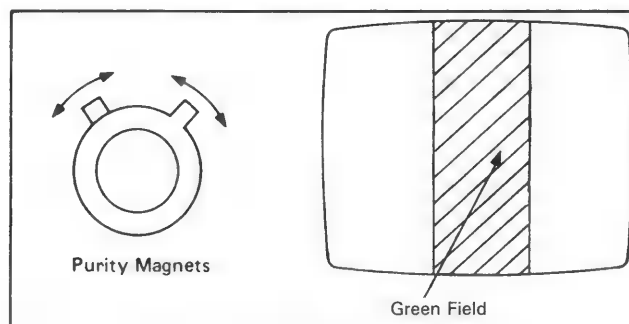


Fig. 2

10. Slide the deflection yoke toward you so that good purity is obtained.
11. Confirm the purity with a red and a blue screen.
12. Emit the Red, Green and Blue at the same time.
13. Confirm the white quality.
14. Tighten clamp screw when complete.

CONVERGENCE ADJUSTMENT

1. EQUIPMENT TO USED

Video Generator.

2. ADJUSTMENT PROCEDURE

- 1. Operate the monitor 30 minutes.
- 2. Set the Input Selector Switches to LINE A.
- 3. Input a Cross Hatch patten signal to VIDEO input terminal.
- 4. Match the R and B at picture center with four pole magnet.
- (Rotate the two ring magnets to move the red and blue dots Circularly in the opposite derection).
- 5. At the picture center, match R and B to G with the six-pole magnet.

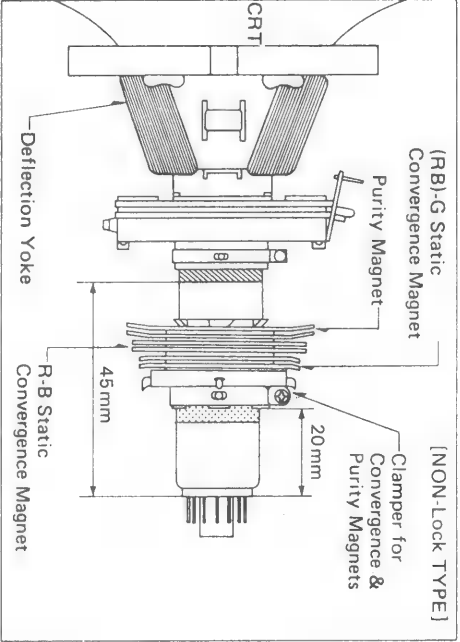


Fig. 3

- 6. Tilt the DY up and down, match the R and B for H line of center. (Fig. 4)
- 7. Tilt the DY left and right, match the R and B for H line of up and down side and V line of left and right side. (Fig. 5)

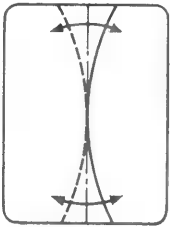


Fig. 4

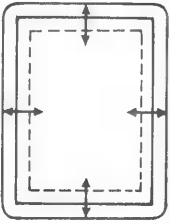


Fig. 5

- 8. When the periphery convergence is bad, fix the good point for convergence by inserting parmalloy.

FOCUS ADJUSTMENT

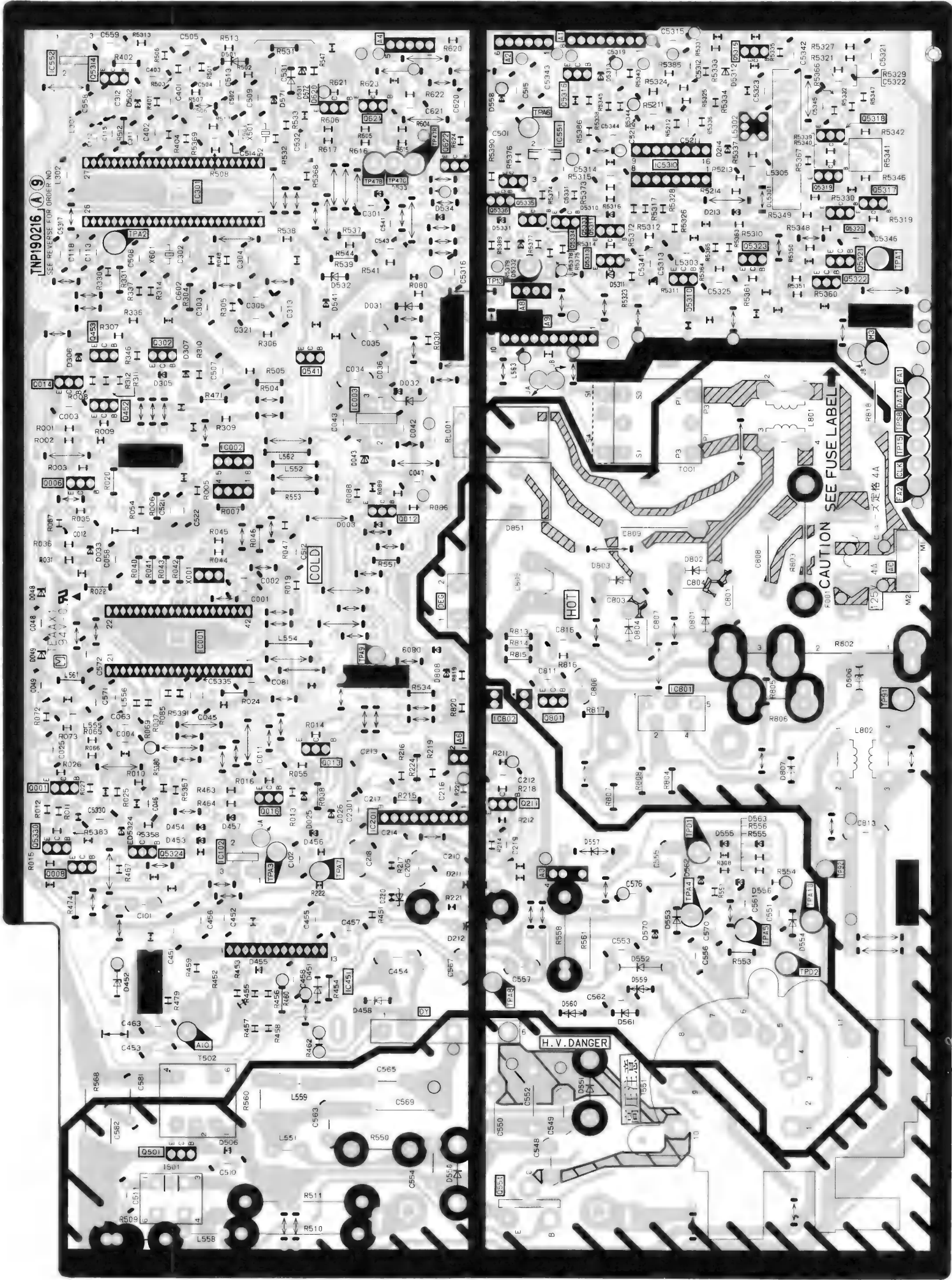
Adjust the focus control (on the FBT) to obtain the sharpest and clearest picture.

Circuit Boards

A-P.C. board TNP190216ZA

A-P.C. Board				
IC				
IC001	E-4	Q5319	A-7	
IC002	E-5	Q5320	A-6	
IC003	D-5	Q5321	A-6	
IC102	E-3	Q5322	B-6	
IC201	D-3	Q5323	E-3	
IC301	E-7	Q5324	F-3	
IC451	D-1	Q5330	C-6	
IC551	C-7	Q5333	C-6	
IC552	E-7	Q5334	C-7	
IC801	B-4	Q5335	C-7	
IC802	C-4	Q5336		
IC5310	B-7	VR		
TRANSISTOR				
Q001	F-3	TPA1	A-6	
Q006	E-5	TPA2	E-6	
Q008	F-3	TPA3	D-3	
Q012	D-5	TPA4	B-3	
Q013	D-4	TPA5	B-3	
Q014	F-6	TPA6	C-7	
Q016	D-3	TPA8	C-2	
Q211	C-3	TPA9	D-4	
Q302	E-6	TPA10	A-3	
Q452	E-5	TPD1	B-3	
Q453	E-6	TPD2	B-2	
Q501	E-1	TP13	C-6	
Q541	D-6	TP47R	D-7	
Q551	C-1	TP47G	D-7	
Q620	D-7	TP47B	A-4	
Q621	D-7	TP91	A-3	
Q622	C-7	TP92	A-5	
Q801	C-4	TP15	A-5	
Q8310	B-6	FA1	A-5	
Q8311	C-6	FA2	A-5	
Q8313	C-6	CLK	A-5	
Q8314	E-7	TPS8	A-5	
Q8315	B-7	DATA	A-5	
Q8316	C-7	A10	E-1	
Q8317	A-7			
Q8318	A-7			

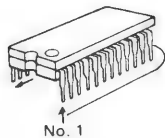
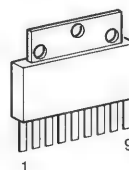

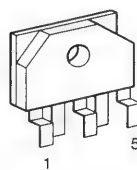
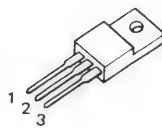
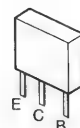
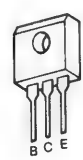

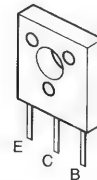
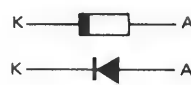
ADDRESS INFORMATION







Terminal Guide of IC's, Transistors and Diode

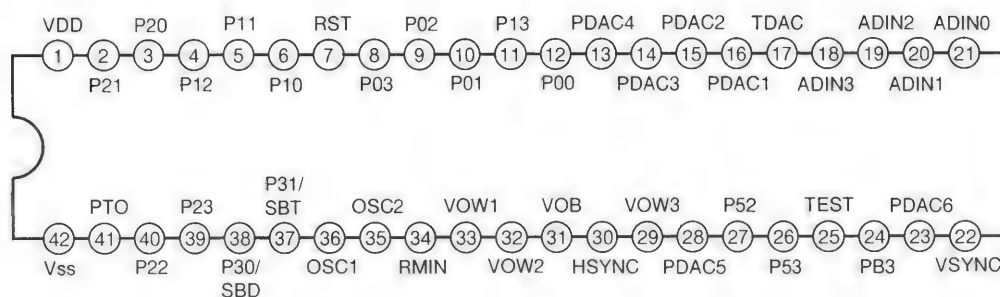
 <p>AN5163K : 52 Pin MN152811HYG: 42 Pin TC4053BP : 16 Pin μPD6263CX : 8 Pin</p>	 <p>AN5265</p>	 <p>μPC2255HLB</p>	 <p>STR30130</p>	
 <p>AN78M09LB AN78M10LB AN78M05LB</p>	 <p>2SC3311AQR 2SA1309AQR</p>	 <p>BU2506DFLB</p>	 <p>2SC1573AH 2SA1767QTA</p>	 <p>2SC3063RL</p>
<p>Diode</p> 				

# IC Function of Terminal and Equivalent Circuit

## IC001 MN152811HYG

Pin No.	Mark	I/O	Function
1	VDD	I	Supply +5V.
2	P21	I	TV/AV select. Line A: H
3	P20	O	LED control.
4	P12	--	Not used.
5	P11	O	Audio defeat control. Defeat: H Normal: L
6	P10	O	Line A/B select. Line A: H Line B: L
7	RST	I	Reset terminal.
8	P03	--	Not used.
9	P02	--	Not used.
10	P01	--	Not used.
11	P13	I	BPF/DL select.
12	P00	O	Relayoutput. CRT ON: H CRT OFF: L
13	PDAC4	--	Not used.
14	PDAC3	--	V size output.
15	PDAC2	--	Not used.
16	PDAC1	O	Audio DAC output.
17	TDAC	--	Not used.
18	ADIN3	I	Key input 2.
19	ADIN2	I	SOS input.
20	ADIN1	I	Key input 1.
21	ADIN0	--	Ground.
22	VSYNC	I	V pulse for onscreen.
23	PDAC6	--	Not used.
24	PB3	O	Video defeat control. Defeat: H Normal: L
25	TEST	--	Ground.
26	P53	I	SYNC.input.
27	P52	I	IIC control input.
28	PDAC5	--	Not used.
29	VOW3	O	Character output.(B OUT)
30	HSYNC	I	H pulse for onscreen.
31	VOB	O	Character output.(BLK OUT)
32	VOW2	O	Character output.(G OUT)
33	VOW1	O	Character output.(R OUT)
34	RMIN	I	Fixed at H.
35	OSC2	I	6MHz oscillation input.
36	OSC1	O	6MHz oscillation input.
37	P31/SBT	O	Serial clock output.
38	P30/SBD	O	Serial data output.
39	P23	--	Ground.
40	P22	I	Fixed at H.
41	PTO	O	Not used.
42	Vss	--	Ground.

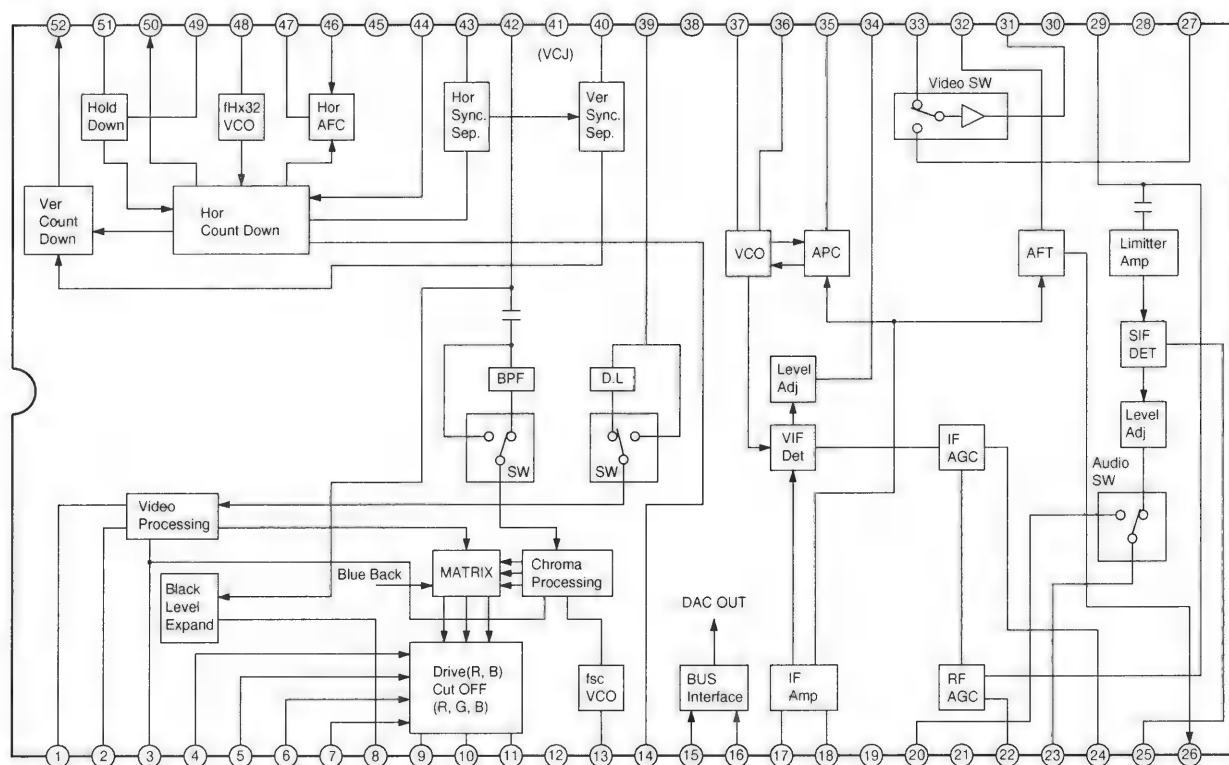
## IC001 MN152811HYG

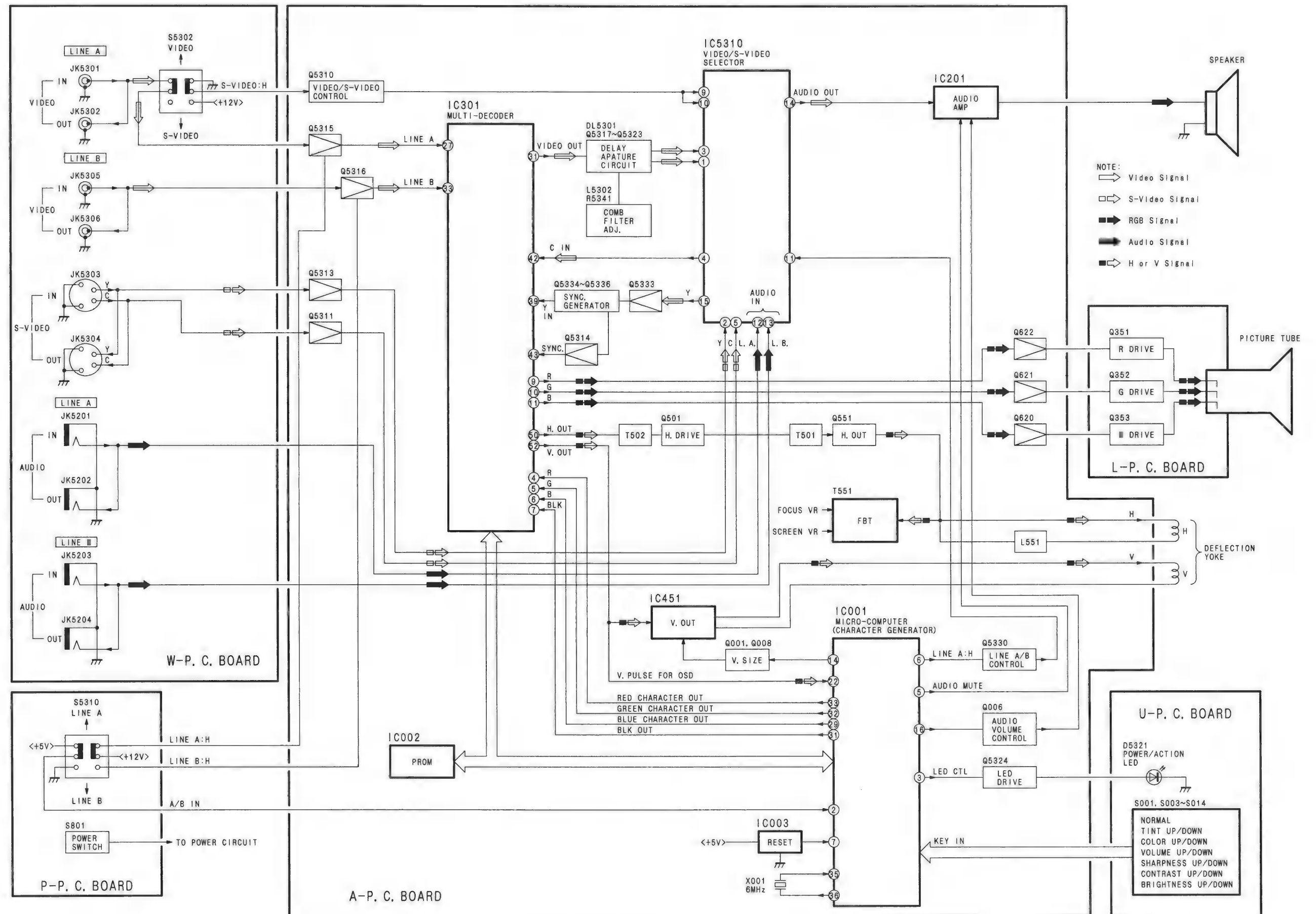


## IC301 AN5163K

Pin No.	Function	Pin No.	Function	Pin No.	Function
1	ABL/CRT neck protect	19	Not used	37	Not used
2	Pedestal clamp	20	Ground	39	Power supply +9V
3	ACL/service switch	21	Not used	39	Luminance signal input
4	R signal input	22	Not used	40	Vertical peak clamp
5	G signal input	23	Not used	41	Ground
6	B signal input	24	Not used	42	Chroma signal input
7	Ys signal input	25	Not used	43	Sync.signal input
8	Black detection	26	Not used	44	Flyback pulse
9	R signal output	27	Exit video signal input	45	Power supply +6.2V
10	G signal oupput	28	Ground	46	Saw tooth
11	B signal output	29	Not used	47	Horizontal AFC
12	Power supply +9V	30	Power supply +9V	48	Horizontal OSC
13	Chroma VCO	31	Video signal output	49	X-ray protect
14	Lock detect	32	Not used	50	Horizontal output
15	Serial data	33	Internal video signal input	51	Hold down reference
16	Serial clock	34	Not used	52	Vertical output
17	Power supply +5V	35	Not used		
18	Not used	36	Not used		

## IC301 AN5163K





Schematic Diagram

IMPORTANT SAFETY NOTICE

THE SHADED AREA ON THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION, FIRE AND ELECTRICAL SHOCK HAZARDS.

WHEN SERVICING, IT IS ESSENTIAL THAT ONLY MANUFACTURER'S SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SHADED AREAS OF THE SCHEMATIC.

- NOTE:
- S001 : Normal switch.
  - S003 : Brightness control (−).
  - S004 : Brightness control (+).
  - S005 : Tint control (−).
  - S006 : Tint control (+).
  - S007 : Color control (−).
  - S008 : Color control (+).
  - S009 : Volume control (−).
  - S010 : Volume control (+).
  - S011 : Sharpness control (−).
  - S012 : Sharpness control (+).
  - S013 : Contrast control (−).
  - S014 : Contrast control (+).
  - S801 : Power switch in OFF position.
  - S5301 : S-Video impedance switch in 75 ohm position.
  - S5302 : Line A input select switch in Line A position.
  - S5310 : Input select switch in Line A position.
  - RESISTOR
 


All resistors are carbon 1/4W resistor, unless specified otherwise.

Unit of resistance is OHM ( $\Omega$ ), (K=1,000, M=1,000,000).
  - CAPACITOR
 






All capacitors are ceramic 50V capacitor, unless specified otherwise.

Unit of capacitance is  $\mu$ F, unless otherwise noted.
  - COIL
 

Unit of inductance is  $\mu$ H.
  - TEST POINT
 

 : Test point position.
  - VOLTAGE MEASUREMENT
 


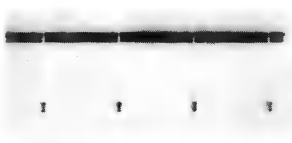
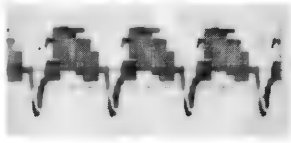
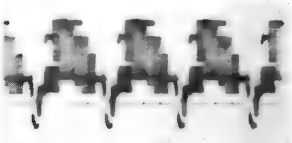


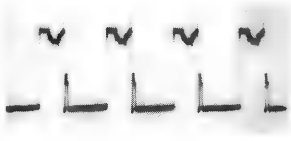
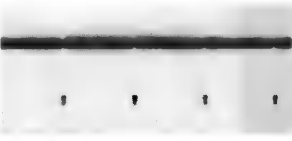
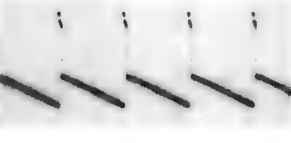




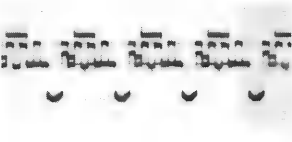

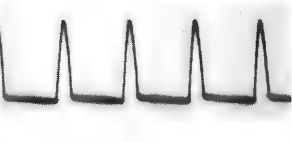

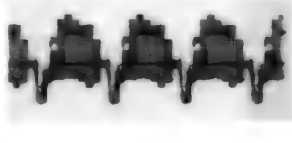
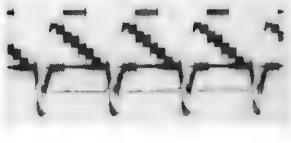
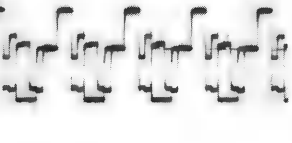
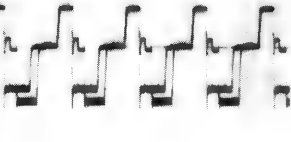

Voltage is measured by an electronic voltmeter receiving rainbow color bar signal when all customer's are set to fully clockwise position.

This schematic diagram is the latest at the time of printing and subject to change without notice.
  - Positive voltage lines
    -  Video signal
    -  S-Video signal
    -  RGB signal
    -  H or V output signal
    -  Audio signal

**Note:**

The power Circuit board contains ■ circuit area which uses separate power supply to isolate the ground connection. The circuit is defined by HOT and COLD indications in the schematic diagram. Take the following precautions.

- PRECAUTIONS:**
- Do not touch the hot part or the hot and cold parts at the same time or you may receive ■ shock.
  - Do not short-circuit the hot and cold circuits or a fuse may blow and parts may break.
  - Do not connect an instrument, such as an oscilloscope, to the hot and cold circuits simultaneously of ■ fuse may blow. Connect the ground of instruments to the ground connection of the circuit being measured.
  - Make sure to disconnect the power plug before removing the chassis.

 <p>① IC001 30 Pin (A-P.C. Board) 5.6Vp-p/20µsec.div.</p>	 <p>② IC001 22 Pin (A-P.C. Board) 4.6Vp-p/5msec.div.</p>	 <p>③ IC301 27 Pin (A-P.C. Board) 1.4Vp-p/20µsec.div.</p>	 <p>④ IC301 31 Pin (A-P.C. Board) 2.0Vp-p/20µsec.div.</p>
 <p>⑤ IC301 39 Pin (A-P.C. Board) 0.8Vp-p/20µsec.div.</p>	 <p>⑥ IC301 42 Pin (A-P.C. Board) 0.6Vp-p/20µsec.div.</p>	 <p>⑦ IC301 50 Pin (A-P.C. Board) 3.2Vp-p/20µsec.div.</p>	 <p>⑧ IC301 52 Pin (A-P.C. Board) 4.7Vp-p/5msec.div.</p>
 <p>⑨ IC451 11 Pin (A-P.C. Board) 52Vp-p/5msec.div.</p>	 <p>⑩ IC5310 4 Pin (A-P.C. Board) 1.5Vp-p/20µsec.div.</p>	 <p>⑪ IC5310 15 Pin (A-P.C. Board) 1.3Vp-p/20µsec.div.</p>	 <p>⑫ TP47R (A-P.C. Board) 5.2Vp-p/20µsec.div.</p>
 <p>⑬ TP47G (A-P.C. Board) 5.0Vp-p/20µsec.div.</p>	 <p>⑭ TP47B (A-P.C. Board) 5.0Vp-p/20µsec.div.</p>	 <p>⑮ Q551-B (A-P.C. Board) 16Vp-p/20µsec.div.</p>	 <p>⑯ Q551-C (A-P.C. Board) 1200Vp-p/20µsec.div.</p>
 <p>⑰ Q5317-E (A-P.C. Board) 2.0Vp-p/20µsec.div.</p>	 <p>⑱ Q5321-E (A-P.C. Board) 1.7Vp-p/20µsec.div.</p>	 <p>⑲ Q5323-E (A-P.C. Board) 2.0Vp-p/20µsec.div.</p>	 <p>⑳ Q351-C (L-P.C. Board) 120Vp-p/20µsec.div.</p>
 <p>㉑ Q352-C (L-P.C. Board) 120Vp-p/20µsec.div.</p>	 <p>㉒ Q353-C (L-P.C. Board) 120Vp-p/20µsec.div.</p>		

# REPLACEMENT PARTS LIST

**Important Safety Notice:** Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
<b>CAPACITORS</b>					
C001	ECKF1H101KB	CAP,C 100PF-K-50V	C521	ECEA1CU100	CAP,E 10UF/16V
C002	ECKF1H101KB	CAP,C 100PF-K-50V	C522	ECQB1H103KF	CAP,P .01UF-K-50V
C003	ECEA1CU221	CAP,E 220UF/16V	<b>C531</b>	<b>ECEA1EU330</b>	<b>CAP,E 33UF/25V</b>
C004	ECKF1H101KB	CAP,C 100PF-K-50V	C532	ECEA1EU4R7	CAP,E 4.7UF/25V
C012	ECEA1HU3R3	CAP,E 3.3UF/50V	C541	ECCF1H121JC	CAP,C 120PF-J-50V
C025	ECEA1HU3R3	CAP,E 3.3UF/50V	<b>C548</b>	<b>ECKD3D121JB</b>	<b>RES,C 120PF-J-2KV</b>
C034	ECEA1CU471	CAP,E 470UF/16V	<b>C549</b>	<b>ECKD3D331JB</b>	<b>CAP,C 330PF-J-2KV</b>
C035	ECEA1EU471	CAP,E 470UF/25V	<b>C550</b>	<b>ECWH12H562JS</b>	<b>CAP,P .0056UF-J-1.2KV</b>
C042	ECEA1HU010	CAP,E 1UF/50V	<b>C552</b>	<b>ECWH12H472JS</b>	<b>CAP,P .0047UF-J-1.2KV</b>
C043	ECEA1CU100	CAP,E 10UF/16V	C553	ECKD2H561KB	CAP,C 560PF-K-500V
C045	ECQB1H123KF	CAP,P .012UF-K-50V	<b>C554</b>	<b>ECQM4333JZ</b>	<b>CAP,P .033UF-J-400V</b>
C046	ECQB1H123KF	CAP,P .012UF-K-50V	<b>C555</b>	<b>ECEA2EU220</b>	<b>CAP,E 22UF/250V</b>
C047	ECQB1H123KF	CAP,P .012UF-K-50V	<b>C557</b>	<b>ECEA1EU471</b>	<b>CAP,E 470UF/25V</b>
C048	ECKF1H103ZF	CAP,C .01UF-Z-50V	C558	ECEA0JU101	CAP,E 100UF/6.3V
C049	ECKF1H103ZF	CAP,C .01UF-Z-50V	C559	ECEA1CU100	CAP,E 10UF/16V
C058	ECKF1H271KB	CAP,C 270PF-K-50V	C561	ECEA1HU2R2	CAP,E 2.2UF/50V
C063	ECKF1H103ZF	CAP,C .01UF-Z-50V	C562	ECKD2H561KB	CAP,C 560PF-K-500V
C081	ECKF1H103ZF	CAP,C .01UF-Z-50V	<b>C563</b>	<b>ECKD3D681JB</b>	<b>CAP,C 680PF-J-2KV</b>
C101	ECEA1CU102	CAP,E 1000UF/16V	C565	ECQE2474KF	CAP,P .47UF-K-250V
C102	ECEA1EU100	CAP,E 10UF/25V	<b>C567</b>	<b>ECEA1VU102</b>	<b>CAP,E 1000UF/35V</b>
C112	ECKF1H103ZF	CAP,C .01UF-Z-50V	<b>C569</b>	<b>ECQF2H304JS</b>	<b>CAP,P .3UF-J-200V</b>
C113	ECEA1CU100	CAP,E 10UF/16V	C571	ECKF1H103KB	CAP,C .01UF-K-50V
C115	ECEA1CU330	CAP,E 33UF/16V	C572	ECKF1H103KB	CAP,C .01UF-K-50V
C118	ECKF1H103ZF	CAP,C .01UF-Z-50V	<b>C581</b>	<b>ECKDNS222ME</b>	<b>CAP,C .0022UF-M-125VAC</b>
C205	ECEA1CU102	CAP,E 1000UF/16V	<b>C582</b>	<b>ECKDNS222ME</b>	<b>CAP,C .0022UF-M-125VAC</b>
C210	ECEA1HUR47	CAP,E .47UF/50V	C602	ECCF1H150JU	CAP,C 15PF-J-50V
C212	ECEA1CU100	CAP,E 10UF/16V	C620	ECEA1CN100S	CAP,E 10UF/16V
C213	ECEA1CU100	CAP,E 10UF/16V	C621	ECEA1CN100S	CAP,E 10UF/16V
C214	ECEA1CU100	CAP,E 10UF/16V	<b>C801</b>	<b>ECKD2H103PU</b>	<b>CAP,C .01UF-P-500V</b>
C216	ECQB1H683KF	CAP,P .068UF-K-50V	<b>C803</b>	<b>ECKD2H103PU</b>	<b>CAP,C .01UF-P-500V</b>
C217	ECEA1EU101	CAP,E 100UF/25V	<b>C804</b>	<b>ECKD2H103PU</b>	<b>CAP,C .01UF-P-500V</b>
C218	ECEA1EU102	CAP,E 1000UF/25V	<b>C805</b>	<b>EC0S2DA471BB</b>	<b>CAP,E 470/200V</b>
C219	ECQB1H152KF	CAP,P .0015UF-K-50V	<b>C806</b>	<b>ECEA2CGE220</b>	<b>CAP,E 22UF/160V</b>
C301	ECEA1CN100S	CAP,E 10UF/16V	<b>C808</b>	<b>ECQU2A823MN</b>	<b>CAP,P .082UF-M-250VAC</b>
C302	ECEA1AU331	CAP,E 330UF/10V	<b>C809</b>	<b>ECQU2A224MN</b>	<b>CAP,P .22UF-M-250VAC</b>
C304	ECEA1EU4R7	CAP,E 4.7UF/25V	<b>C811</b>	<b>ECEA1HN3R3S</b>	<b>CAP,E 3.3UF/50V</b>
C305	ECEA1HUR33	CAP,E .33UF/50V	<b>C813</b>	<b>ECEA160V33Z</b>	<b>CAP,E 33UF/160V</b>
C311	ECEA1CU470	CAP,E 47UF/16V	<b>C816</b>	<b>ECEA0JU221</b>	<b>CAP,E 220UF/6.3V</b>
C312	ECKF1H103ZF	CAP,C .01UF-Z-50V	C2301	ECQV1H104JZ	CAP,P .1UF-J-50V
C313	ECEA1CU220	CAP,E 22UF/16V	C5211	ECEA1CU330	CAP,E 33UF/16V
C321	ECEA1HU4R7	CAP,E 4.7UF/50V	C5212	ECEA1CU330	CAP,E 33UF/16V
C351	ECKF1H271KB	CAP,C 270PF-K-50V	C5312	ECEA1CU100	CAP,E 10UF/16V
C352	ECKF1H271KB	CAP,C 270PF-K-50V	C5313	ECKF1H103ZF	CAP,C .01UF-Z-50V
C353	ECKF1H331KB	CAP,C 330PF-K-50V	C5314	ECQB1H103KF	CAP,P .01UF-K-50V
C355	ECKD3D681KB	CAP,C 680PF-K-2KV	C5315	ECEA1CU330	CAP,E 33UF/16V
C356	ECEA1CU100	CAP,E 10UF/16V	C5316	ECEA1HU010	CAP,E 1UF/50V
C357	ECEA1CU101	CAP,E 100UF/16V	C5317	ECEA1HU010	CAP,E 1UF/50V
C358	ECKD2H103KB	CAP,C .01UF-K-500V	C5319	ECEA1CU330	CAP,E 33UF/16V
C359	ECEA2EU3R3	CAP,E 3.3UF/250V	C5321	ECEA1CN100S	CAP,E 10UF/16V
C401	ECEA1HUR33	CAP,E .33UF/50V	C5322	ECQB1H473KF	CAP,P .047UF-K-50V
C402	ECKF1H681KB	CAP,C 680PF-K-50V	C5323	ECQB1H473KF	CAP,P .047UF-K-50V
C403	ECEA1HN010S	CAP,E 1UF/50V	C5325	ECCF1H470JC	CAP,C 47PF-J-50V
C451	ECEA1CGE331	CAP,E 330UF/16V	C5330	ECEA1CU330	CAP,E 33UF/16V
C452	ECQV1H105JZ	CAP,P 1.0UF-J-50V	C5331	ECEA1HUR22	CAP,E .22UF/50V
C453	ECEA1HFS2R2	CAP,E 2.2UF/50V	C5341	ECEA1HU010	CAP,E 1UF/50V
C454	ECEA1EU222	CAP,E 2200UF/25V	C5342	ECEA1HU010	CAP,E 1UF/50V
C455	ECEA1VGE101	CAP,E 100UF/35V	C5343	ECEA1HU010	CAP,E 1UF/50V
C456	ECQB1H473KF	CAP,P .047UF-K-50V	C5344	ECEA1HU010	CAP,E 1UF/50V
C457	ECQB1H103KF	CAP,P .01UF-K-50V	C5345	ECKF1H103ZF	CAP,C .01UF-Z-50V
C463	ECEA1HU010	CAP,E 1UF/50V	C5346	ECQB1H103KF	CAP,P .01UF-K-50V
C501	ECEA1CU101	CAP,E 100UF/16V			
C502	ECEA1HU3R3	CAP,E 3.3UF/50V			
C503	ECQB1H123KF	CAP,P .012UF-K-50V			
C504	ECQB1H103KF	CAP,P .01UF-K-50V			
C505	ECQB1H223KF	CAP,P .022UF-K-50V			
C506	ECEA1EU221	CAP,E 220UF/25V			
C508	ECQB1H223KF	CAP,P .022UF-K-50V			
C509	ECCF1H221JU	CAP,C 220PF-J-50V			
C510	ECCD2H100D	CAP,C 10PF-D-500V			
C511	ECKD2H182KB	CAP,C .0018UF-K-500V			
C512	ECEA1EU221	CAP,E 220UF/25V			
C515	ECEA1EU100	CAP,E 10UF/25V			
			<b>DIODES</b>		
			<b>D003</b>	<b>MA167</b>	<b>DIODE</b>
			D025	MA165	DIODE
			D026	MA165	DIODE
			D031	ERA15-01	DIODE
			D032	MA4110M	DIODE, ZENER
			D033	MA165	DIODE
			D043	MA4110M	DIODE, ZENER
			D048	MA4068M	DIODE, ZENER
			D049	MA4068M	DIODE, ZENER
			D211	EU02V0	DIODE



## REPLACEMENT PARTS LIST

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Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
D212	TVSRD2.0FB	DIODE, ZENER			<b>COILS</b>
D213	MA165	DIODE			
D214	MA165	DIODE			
D220	EU02W	DIODE	DL5301	EFDEN645B35B	DELAY LINE
D305	MA29W	DIODE	<b>DEG</b>	<b>0LK19048A</b>	<b>COIL, DEGAUSSING 13"</b>
D306	MA165	DIODE	<b>DY</b>	<b>0LY15304F</b>	<b>YOKE, DEFLECTION</b>
D307	MA165	DIODE	L001	EXCELSA24	FERRITE BEAD
D451	ERA15-01	DIODE	L301	ELESN220KA	COIL, PEAKING 22UH
D452	MA1082M	DIODE, ZENER	L302	ELESN470KA	COIL, 47UH
D453	MA4150M	DIODE	<b>L551</b>	<b>TLH15629T1</b>	<b>COIL</b>
D454	MA165	DIODE	L552	EXCELSA39	FERRITE BEAD
D455	MA4120M	DIODE	L554	EXCELSA39	FERRITE BEAD
D456	MA4180H	DIODE, ZENER	L555	EXCELSR35S	FERRITE BEAD
D457	MA165	DIODE	L556	EXCELSR35S	FERRITE BEAD
D458	ERA15-01	DIODE	L558	EXCELSA24	FERRITE BEAD
D501	MA1082L	DIODE	L559	ELC08D055	FILTER
D502	MA700	DIODE	L561	EXCELSA24	FERRITE BEAD
D506	MA165	DIODE	L562	EXCELSA39	FERRITE BEAD
<b>D531</b>	<b>AS01</b>	<b>DIODE</b>	L563	EXCELSR35S	FERRITE BEAD
<b>D532</b>	<b>MA1062L</b>	<b>DIODE, ZENER</b>	<b>L801</b>	<b>ELF18D650K</b>	<b>CHOKES, AC LINE</b>
D533	MA4082M	DIODE	L5302	EIK7ES010B	VC MIXER COIL
D534	MA165	DIODE	L5303	ELESN390KA	COIL, PEAKING 39UH
D541	MA165	DIODE	L5305	ELESN100KA	COIL, PEAKING 10UH
D550	TVSRU2	DIODE			
<b>D551</b>	<b>ERD07-15</b>	<b>DIODE</b>			<b>TRANSISTORS</b>
<b>D552</b>	<b>TVSRU2</b>	<b>DIODE</b>			
<b>D554</b>	<b>AS01</b>	<b>DIODE</b>	Q001	2SC3311AQR	TRANSISTOR
D555	MA165	DIODE	Q006	2SC3311AQR	TRANSISTOR
<b>D556</b>	<b>MA4360H</b>	<b>DIODE, ZENER</b>	Q008	2SA1309QR	TRANSISTOR
D558	MA29W	DIODE	Q012	2SC3311AQR	TRANSISTOR
D559	AS01	DIODE	Q013	2SA1309QR	TRANSISTOR
<b>D560</b>	<b>AS01</b>	<b>DIODE</b>	Q014	2SC3311AQR	TRANSISTOR
<b>D561</b>	<b>AS01</b>	<b>DIODE</b>	Q016	2SC3311AQR	TRANSISTOR
D562	MA165	DIODE	Q211	2SC3311AQR	TRANSISTOR
D563	MA165	DIODE	Q302	2SC3311AQR	TRANSISTOR
<b>D570</b>	<b>MA4062L</b>	<b>DIODE, ZENER</b>	Q351	2SC3063	TRANSISTOR
<b>D571</b>	<b>MA4051L</b>	<b>DIODE, ZENER</b>	Q352	2SC3063	TRANSISTOR
<b>D572</b>	<b>MA4051L</b>	<b>DIODE, ZENER</b>	Q353	2SC3063	TRANSISTOR
<b>D801</b>	<b>EM02BM</b>	<b>DIODE</b>	Q354	2SA1309QR	TRANSISTOR
<b>D802</b>	<b>EM02BM</b>	<b>DIODE</b>	Q452	2SC3311AQR	TRANSISTOR
<b>D803</b>	<b>EM02BM</b>	<b>DIODE</b>	Q453	2SC3311AQR	TRANSISTOR
<b>D804</b>	<b>EM02BM</b>	<b>DIODE</b>	Q501	2SC1573AH	TRANSISTOR
<b>D806</b>	<b>MA2056A</b>	<b>DIODE</b>	Q541	2SC3311AQR	TRANSISTOR
<b>D807</b>	<b>ERC13-08</b>	<b>DIODE</b>	Q551	BU2506DF	TRANSISTOR
D808	MA4051L	DIODE, ZENER	Q620	2SC3311AQR	TRANSISTOR
D809	MA165	DIODE	Q621	2SC3311AQR	TRANSISTOR
<b>D851</b>	<b>TRPF5B0M050F</b>	<b>THERMISTOR</b>	Q622	2SC3311AQR	TRANSISTOR
D5310	MA165	DIODE	<b>Q801</b>	<b>2SA1767Q</b>	<b>TRANSISTOR</b>
D5311	MA165	DIODE	Q5310	2SC3311AQR	TRANSISTOR
D5312	MA165	DIODE	Q5311	2SC3311AQR	TRANSISTOR
D5313	MA165	DIODE	Q5313	2SC3311AQR	TRANSISTOR
D5321	LN31GCP-UH	DIODE, LED	Q5314	2SA1309QR	TRANSISTOR
D5324	MA165	DIODE	Q5315	2SC3311AQR	TRANSISTOR
D5331	MA4039M	DIODE, ZENER	Q5316	2SC3311AQR	TRANSISTOR
D5332	MA165	DIODE	Q5317	2SC3311AQR	TRANSISTOR
		<b>FUSES</b>	Q5318	2SC3311AQR	TRANSISTOR
<b>F001</b>	<b>0BA1F40NU100</b>	<b>FUSE 4.0A/125V</b>	Q5319	2SC3311AQR	TRANSISTOR
		<b>INTEGRATED CIRCUITS</b>	Q5320	2SC3311AQR	TRANSISTOR
IC001	MN152811HYG	INT CKT	Q5321	2SC3311AQR	TRANSISTOR
IC002	24C01AIPB21	INT CKT	Q5322	2SC3311AQR	TRANSISTOR
IC003	UPC2255HLB	INT CKT	Q5323	2SC3311AQR	TRANSISTOR
IC102	AN78M09	PLUS 9V AVR	Q5324	2SC3311AQR	TRANSISTOR
IC201	AN5265	INT CKT	Q5330	2SC3311AQR	TRANSISTOR
IC301	AN5163K	INT CKT	Q5333	2SC3311AQR	TRANSISTOR
IC451	LA7835-TV	INT CKT	Q5334	2SC3311AQR	TRANSISTOR
IC551	AN78M10	PLUS 10V AVR	Q5335	2SC3311AQR	TRANSISTOR
IC552	AN78M05	PLUS 5V AVR	Q5336	2SA1309QR	TRANSISTOR
<b>IC801</b>	<b>TVSSTR30130</b>	<b>INT CKT</b>			<b>RELAYS</b>
<b>IC802</b>	<b>TLP621GR</b>	<b>PHOTO COUPLER</b>	<b>RL001</b>	<b>TSE1864</b>	<b>RELAY</b>
IC5310	TVSTC4053	INT CKT			



## REPLACEMENT PARTS LIST

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Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
		<b>RESISTORS</b>			
R001	ERDS2TJ472	RES,C 4.7K-J-1/4	R308	ERDS2TJ103	RES,C 10K-J-1/4
R002	ERDS2TJ103	RES,C 10K-J-1/4	R309	ERDS2TJ101	RES,C 100-J-1/4
R005	ERDS2TJ332	RES,C 3.3K-J-1/4	R310	ERDS2TJ101	RES,C 100-J-1/4
R006	ERD25TJ332	RES,C 3.3K-J-1/4	R311	ERDS2TJ122	RES,C 1.2K-J-1/4
R007	ERD25TJ101	RES,C 100-J-1/4	R312	ERDS2TJ122	RES,C 1.2K-J-1/4
R008	ERDS2TJ103	RES,C 10K-J-1/4	R314	ERDS2TJ105	RES,C 1MEG-J-1/4
R009	ERDS2TJ332	RES,C 3.3K-J-1/4	R330	ERDS2TJ560	RES,C 56-J-1/4
R010	ERDS2TJ562	RES,C 5.6K-J-1/4	R331	ERD25TJ560	RES,C 56-J-1/4
R011	ERDS2TJ473	RES,C 47K-J-1/4	R336	ERDS2TJ223	RES,C 22K-J-1/4
R012	ERDS2TJ222	RES,C 2.2K-J-1/4	R337	ERDS2TJ334	RES,C 330K-J-1/4
R013	ERDS2TJ103	RES,C 10K-J-1/4	R346	ERDS2TJ101	RES,C 100-J-1/4
R014	ERDS2TJ103	RES,C 10K-J-1/4	<b>R351</b>	<b>ERG2ANJ123</b>	<b>RES,M 12K-J-2W</b>
R015	ERDS2TJ333	RES,C 33K-J-1/4	<b>R352</b>	<b>ERG2ANJ123</b>	<b>RES,M 12K-J-2W</b>
R016	ERDS2TJ153	RES,C 15K-J-1/4	<b>R353</b>	<b>ERG2ANJ123</b>	<b>RES,M 12K-J-2W</b>
R019	ERDS2TJ103	RES,C 10K-J-1/4	R354	ERDS1TJ272	RES,C 2.7K-J-1/2
R020	ERD25TJ560	RES,C 56-J-1/4	R355	ERDS1TJ272	RES,C 2.7K-J-1/2
R022	ERD25TJ103	RES,C 10K-J-1/4	R356	ERDS1TJ272	RES,C 2.7K-J-1/2
R025	ERDS2TJ822	RES,C 8.2K-J-1/4	R357	ERDS2TJ101	RES,C 100-J-1/4
R027	ERDS2TJ331	RES,C 330-J-1/4	R358	ERDS2TJ101	RES,C 100-J-1/4
R030	ERDS2TJ151	RES,C 150-J-1/4	R359	ERDS2TJ101	RES,C 100-J-1/4
R031	ERDS2TJ153	RES,C 15K-J-1/4	R360	ERDS2TJ331	RES,C 330-J-1/4
R035	ERDS2TJ331	RES,C 330-J-1/4	R361	ERDS2TJ331	RES,C 330-J-1/4
R036	ERDS2TJ822	RES,C 8.2K-J-1/4	R362	ERDS2TJ331	RES,C 330-J-1/4
R037	ERDS2TJ562	RES,C 5.6K-J-1/4	R363	ERDS2TJ561	RES,C 560-J-1/4
R038	ERD25TJ101	RES,C 100-J-1/4	R365	ERDS2TJ221	RES,C 220-J-1/4
R040	ERD25TJ182	RES,C 1.8K-J-1/4	R366	ERDS2TJ470	RES,C 47-J-1/4
R041	ERD25TJ182	RES,C 1.8K-J-1/4	R367	ERDS2TJ470	RES,C 47-J-1/4
R042	ERD25TJ182	RES,C 1.8K-J-1/4	R368	ERDS2TJ470	RES,C 47-J-1/4
R043	ERD25TJ182	RES,C 1.8K-J-1/4	R369	ERDS2TJ101	RES,C 100-J-1/4
R044	ERDS2TJ681	RES,C 680-J-1/4	R401	ERDS2TJ224	RES,C 220K-J-1/4
R045	ERDS2TJ681	RES,C 680-J-1/4	R402	ERD25TJ561	RES,C 560-J-1/4
R046	ERD25TJ392	RES,C 3.9K-J-1/4	R404	ERDS2TJ221	RES,C 220-J-1/4
R047	ERDS2TJ681	RES,C 680-J-1/4	R451	ERDS2TJ221	RES,C 220-J-1/4
R048	ERDS2TJ222	RES,C 2.2K-J-1/4	R452	ERDS2TJ333	RES,C 33K-J-1/4
R054	ERDS2TJ473	RES,C 47K-J-1/4	R453	ERDS2TJ123	RES,C 12K-J-1/4
R055	ERDS2TJ471	RES,C 470-J-1/4	R454	ERDS1FJ2R2	RES,C 2.2-J-1/2
R061	ERDS2TJ102	RES,C 1K-J-1/4	R455	ERDS2TJ183	RES,C 18K-J-1/4
R062	ER0S2CKF2051	RES,M 2.05K-F-1/4	R456	ERDS2TJ682	RES,C 6.8K-J-1/4
R063	ER0S2CKF1961	RES,M 1.96K-F-1/4	R457	ERDS2TJ152	RES,C 1.5K-J-1/4
R064	ER0S2CKF4531	RES,M 4.53K-F-1/4	R458	ERDS2TJ123	RES,C 12K-J-1/4
R065	ERDS2TJ102	RES,C 1K-J-1/4	R459	ERDS2TJ221	RES,C 220-J-1/4
R066	ER0S2CKF1002	RES,M 10K-F-1/4	R460	ERDS1FJ3R3	RES,C 3.3-J-1/2
R067	ER0S2CKF1692	RES,M 16.9K-F-1/4	R462	ERDS2TJ102	RES,C 1K-J-1/4
R068	ER0S2CKF7871	RES,M 7.87K-F-1/4	R463	ERDS2TJ332	RES,C 3.3K-J-1/4
R069	ERDS2TJ102	RES,C 1K-J-1/4	R464	ERDS2TJ103	RES,C 10K-J-1/4
R070	ER0S2CKF3011	RES,M 3.01K-F-1/4	R467	ERDS2TJ102	RES,C 1K-J-1/4
R071	ER0S2CKF2051	RES,M 2.05K-F-1/4	R471	ERD25TJ103	RES,C 10K-J-1/4
R072	ERDS2TJ102	RES,C 1K-J-1/4	R474	ERD25TJ102	RES,C 1K-J-1/4
R073	ER0S2CKF1002	RES,M 10K-F-1/4	R479	ERDS2TJ333	RES,C 33K-J-1/4
R074	ER0S2CKF7871	RES,M 7.87K-F-1/4	R501	ERDS2TJ391	RES,C 390-J-1/4
R075	ER0S2CKF4531	RES,M 4.53K-F-1/4	R502	ERDS2TJ332	RES,C 3.3K-J-1/4
R076	ER0S2CKF3011	RES,M 3.01K-F-1/4	R503	ERDS2TJ332	RES,C 3.3K-J-1/4
R078	ER0S2CKF1961	RES,M 1.96K-F-1/4	R504	ERD25TJ821	RES,C 820-J-1/4
R080	ERDS2TJ122	RES,C 1.2K-J-1/4	R505	ERDS2TJ472	RES,C 4.7K-J-1/4
<b>R081</b>	<b>ERDS2TJ272</b>	<b>RES,C 2.7K-J-1/4</b>	R506	ERDS2TJ560	RES,C 56-J-1/4
R086	ERDS2TJ333	RES,C 33K-J-1/4	R507	ERDS2TJ272	RES,C 2.7K-J-1/4
R087	ERDS2TJ472	RES,C 4.7K-J-1/4	R508	ERDS2TJ392	RES,C 3.9K-J-1/4
<b>R088</b>	<b>ERDS2TJ102</b>	<b>RES,C 1K-J-1/4</b>	R509	ERG2SJS182	RES,M 1.8K-J-2W
<b>R089</b>	<b>ERDS2TJ333</b>	<b>RES,C 33K-J-1/4</b>	R510	ERG3ANJ332	RES,M 3.3K-J-3W
R211	ERDS2TJ103	RES,C 10K-J-1/4	R511	ERG3ANJ332	RES,M 3.3K-J-3W
R212	ERDS2TJ274	RES,C 270K-J-1/4	R512	ERD25TJ562	RES,C 5.6K-J-1/4
R214	ERDS2TJ102	RES,C 1K-J-1/4	R513	ERDS2TJ122	RES,C 1.2K-J-1/4
R215	ERD25TJ102	RES,C 1K-J-1/4	R517	ERDS2TJ224	RES,C 220K-J-1/4
R216	ERDS2TJ122	RES,C 1.2K-J-1/4	<b>R531</b>	<b>ERQ14AJ470</b>	<b>RES,F 47-J-1/4</b>
R217	ERDS2TJ104	RES,C 100K-J-1/4	<b>R532</b>	<b>ER0S2CKF6190</b>	<b>RES,M 619-F-1/4</b>
R218	ERDS2TJ274	RES,C 270K-J-1/4	<b>R533</b>	<b>ER0S2CKF5600</b>	<b>RES,M 560-F-1/4</b>
R219	ERDS2TJ103	RES,C 10K-J-1/4	<b>R534</b>	<b>ERDS1TJ473</b>	<b>RES,C 47K-J-1/2</b>
R220	ERDS2TJ4R7	RES,C 4.7-J-1/4	<b>R535</b>	<b>ER0S2CKF4701</b>	<b>RES,M 4.7K-F-1/4</b>
<b>R221</b>	<b>ERQ1CJP6R8</b>	<b>RES,F 6.8-J-1W</b>	R538	ERDS2TJ561	RES,C 560-J-1/4
R305	ERDS2TJ102	RES,C 1K-J-1/4	<b>R539</b>	<b>ER025CKF100</b>	<b>RES,M 10-F-1/4</b>
R306	ERDS2TJ102	RES,C 1K-J-1/4	R541	ERDS2TJ333	RES,C 33K-J-1/4
R307	ERDS2TJ101	RES,C 100-J-1/4	R544	ERDS2TJ103	RES,C 10K-J-1/4
			R547	ERDS2TJ153	RES,C 15K-J-1/4
			R550	ERG1ANJ102	RES,M 1K-J-1W

## REPLACEMENT PARTS LIST

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Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
R551	ERDS1FJ1R0	RES,C 1.0-J-1/2	R5340	ERDS2TJ102	RES,C 1K-J-1/4
R553	ERD25TJ100	RES,C 10-J-1/4	R5341	EVND8AA03B22	CONTROL 200 OHM
R554	ERDS2TJ823	RES,C 82K-J-1/4	R5342	ERDS2TJ331	RES,C 330-J-1/4
R555	ERDS2TJ154	RES,C 150K-J-1/4	R5343	ERDS2TJ331	RES,C 330-J-1/4
R556	ERDS2TJ472	RES,C 4.7K-J-1/4	R5344	ERDS2TJ103	RES,C 10K-J-1/4
R557	ERDS2TJ103	RES,C 10K-J-1/4	R5345	ERDS2TJ152	RES,C 1.5K-J-1/4
R558	ERQ12HKR22	RES,F .22-K-1/2	R5346	ERDS2TJ331	RES,C 330-J-1/4
R560	ERQ14AJ101	RES,F 100-J-1/4	R5347	ERDS2TJ152	RES,C 1.5K-J-1/4
R561	ERQ12HKR22	RES,F .22-K-1/2	R5348	ERDS2TJ821	RES,C 820-J-1/4
R604	ERDS2TJ471	RES,C 470-J-1/4	R5349	ERDS2TJ102	RES,C 1K-J-1/4
R605	ERDS2TJ331	RES,C 330-J-1/4	R5350	ERDS2TJ122	RES,C 1.2K-J-1/4
R606	ERDS2TJ331	RES,C 330-J-1/4	R5351	ERDS2TJ682	RES,C 6.8K-J-1/4
R615	ERDS2TJ103	RES,C 10K-J-1/4	R5357	ERDS2TJ103	RES,C 10K-J-1/4
R616	ERDS2TJ103	RES,C 10K-J-1/4	R5358	ERDS2TJ101	RES,C 100-J-1/4
R617	ERDS2TJ103	RES,C 10K-J-1/4	R5360	ERDS2TJ152	RES,C 1.5K-J-1/4
R620	ERDS2TJ272	RES,C 2.7K-J-1/4	R5361	ERDS2TJ391	RES,C 390-J-1/4
R621	ERDS2TJ122	RES,C 1.2K-J-1/4	R5363	ERDS2TJ222	RES,C 2.2K-J-1/4
R622	ERDS2TJ472	RES,C 4.7K-J-1/4	R5364	ERDS2TJ681	RES,C 680-J-1/4
R623	ERDS2TJ122	RES,C 1.2K-J-1/4	R5365	ERDS2TJ821	RES,C 820-J-1/4
R624	ERDS2TJ122	RES,C 1.2K-J-1/4	R5366	ERDS2TJ103	RES,C 10K-J-1/4
R802	ERF20ZJ271	RES,W 270-J-20W	R5367	ERDS2TJ103	RES,C 10K-J-1/4
R803	ERF3AK1R0	RES,W 1.0-10-3W	R5368	ERDS2TJ561	RES,C 560-J-1/4
R804	ERD25TJ224	RES,C 220K-J-1/4	R5369	ERDS2TJ820	RES,C 82-J-1/4
R805	ERDS1FJ103	RES,C 10K-J-1/2	R5372	ERDS2TJ821	RES,C 820-J-1/4
R806	ERF5ZK5R6	RES,W 5.6-K-5W	R5373	ERDS2TJ332	RES,C 3.3K-J-1/4
R807	ERQ14AJ470V	RES,F 47-J-1/4	R5374	ERDS2TJ470	RES,C 47-J-1/4
R808	ERQ14AJ470V	RES,F 47-J-1/4	R5375	ERDS2TJ334	RES,C 330K-J-1/4
R813	ERDS1FJ2R2	RES,C 2.2-J-1/2	R5376	ERDS2TJ332	RES,C 3.3K-J-1/4
R814	ERDS1FJ2R2	RES,C 2.2-J-1/2	R5377	ERDS2TJ681	RES,C 680-J-1/4
R815	ERDS1FJ2R7	RES,C 2.7-J-1/2	R5378	ERDS2TJ821	RES,C 820-J-1/4
R816	ERDS2TJ152	RES,C 1.5K-J-1/4	R5379	ERDS2TJ221	RES,C 220-J-1/4
R817	ERDS1TJ393	RES,C 39K-J-1/2	R5380	ERDS2TJ103	RES,C 10K-J-1/4
R818	ERC12ZGK335	RES,S 3.3MEG-K-1/2	R5383	ERDS2TJ103	RES,C 10K-J-1/4
R819	ERDS2TJ221	RES,C 220-J-1/4	R5385	ERDS2TJ563	RES,C 56K-J-1/4
R820	ERDS2TJ103	RES,C 10K-J-1/4	R5386	ERDS2TJ563	RES,C 56K-J-1/4
R5201	ERD25TJ102	RES,C 1K-J-1/4	R5389	ERDS2TJ222	RES,C 2.2K-J-1/4
R5202	ERD25TJ104	RES,C 100K-J-1/4	R5390	ERDS2TJ222	RES,C 2.2K-J-1/4
R5203	ERD25TJ102	RES,C 1K-J-1/4	R5391	ERDS2TJ103	RES,C 10K-J-1/4
R5204	ERD25TJ104	RES,C 100K-J-1/4			
R5205	ERD25TJ750	RES,C 75-J-1/4			
R5211	ERDS2TJ562	RES,C 5.6K-J-1/4			
R5212	ERDS2TJ562	RES,C 5.6K-J-1/4			
R5213	ERDS2TJ104	RES,C 100K-J-1/4			
R5214	ERDS2TJ104	RES,C 100K-J-1/4			
R5306	ERD25TJ750	RES,C 75-J-1/4			
R5307	ERD25TJ750	RES,C 75-J-1/4			
R5308	ERD25TJ750	RES,C 75-J-1/4			
R5310	ERDS2TJ333	RES,C 33K-J-1/4			
R5311	ERDS2TJ333	RES,C 33K-J-1/4			
R5312	ERDS2TJ333	RES,C 33K-J-1/4			
R5313	ERDS2TJ562	RES,C 5.6K-J-1/4			
R5314	ERDS2TJ333	RES,C 33K-J-1/4			
R5315	ERDS2TJ101	RES,C 100-J-1/4			
R5316	ERDS2TJ103	RES,C 10K-J-1/4			
R5317	ERDS2TJ470	RES,C 47-J-1/4			
R5319	ERDS2TJ123	RES,C 12K-J-1/4			
R5321	ERDS2TJ393	RES,C 39K-J-1/4			
R5323	ERDS2TJ223	RES,C 22K-J-1/4			
R5324	ERDS2TJ331	RES,C 330-J-1/4			
R5325	ERDS2TJ822	RES,C 8.2K-J-1/4			
R5326	ERDS2TJ152	RES,C 1.5K-J-1/4			
R5327	ERDS2TJ181	RES,C 180-J-1/4			
R5328	ERDS2TJ101	RES,C 100-J-1/4			
R5329	ERDS2TJ102	RES,C 1K-J-1/4			
R5330	ERDS2TJ183	RES,C 18K-J-1/4			
R5331	ERDS2TJ333	RES,C 33K-J-1/4			
R5332	ERDS2TJ123	RES,C 12K-J-1/4			
R5333	ERDS2TJ331	RES,C 330-J-1/4			
R5334	ERDS2TJ103	RES,C 10K-J-1/4			
R5335	ERDS2TJ152	RES,C 1.5K-J-1/4			
R5336	ERDS2TJ333	RES,C 33K-J-1/4			
R5337	ERDS2TJ181	RES,C 180-J-1/4			
R5338	ERDS2TJ333	RES,C 33K-J-1/4			
R5339	ERDS2TJ102	RES,C 1K-J-1/4			
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## REPLACEMENT PARTS LIST

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Ref. No.	Part No.	Description	Ref. No.	Part No.	Description																																																																								
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M001	EASG8P79A2	SPEAKER, 3 "	<div>RESISTOR</div> <table><thead><tr><th colspan="4">PART NAME &amp; DESCRIPTION</th></tr><tr><th colspan="2">TYPE</th><th colspan="2">ALLOWANCE</th></tr></thead><tbody><tr><td>C</td><td>Carbon</td><td>F</td><td>+/- 1%</td></tr><tr><td>F</td><td>Fuse</td><td>J</td><td>+/- 5%</td></tr><tr><td>M</td><td>Metal Oxide</td><td>K</td><td>+/- 10%</td></tr><tr><td>S</td><td>Solid</td><td>M</td><td>+/- 20%</td></tr><tr><td>W</td><td>Wire Wound</td><td>G</td><td>+/- 2%</td></tr></tbody></table> <div>Part No. Description</div> <div>Example: ERD25TJ104 (C) 100KΩ (J) 1/4W</div> <div>CAPACITOR</div> <table><thead><tr><th colspan="4">PART NAME &amp; DESCRIPTION</th></tr><tr><th colspan="2">TYPE</th><th colspan="2">ALLOWANCE</th></tr></thead><tbody><tr><td>C</td><td>Ceramic</td><td>C</td><td>+/- 0.25pF</td></tr><tr><td>E</td><td>Electrolytic</td><td>D</td><td>+/- 0.5pF</td></tr><tr><td>P</td><td>Polyester</td><td>F</td><td>+/- 1pF</td></tr><tr><td>S</td><td>Styrol</td><td>J</td><td>+/- 5%</td></tr><tr><td>T</td><td>Tantalum</td><td>K</td><td>+/- 10%</td></tr><tr><td></td><td></td><td>L</td><td>+/- 15%</td></tr><tr><td></td><td></td><td>M</td><td>+/- 20%</td></tr><tr><td></td><td></td><td>P</td><td>+100% -0%</td></tr><tr><td></td><td></td><td>Z</td><td>+80% -20%</td></tr></tbody></table> <div>Part No. Description</div> <div>Example: ECKF1H103ZF (C) 0.01μF (Z) 50V</div>			PART NAME & DESCRIPTION				TYPE		ALLOWANCE		C	Carbon	F	+/- 1%	F	Fuse	J	+/- 5%	M	Metal Oxide	K	+/- 10%	S	Solid	M	+/- 20%	W	Wire Wound	G	+/- 2%	PART NAME & DESCRIPTION				TYPE		ALLOWANCE		C	Ceramic	C	+/- 0.25pF	E	Electrolytic	D	+/- 0.5pF	P	Polyester	F	+/- 1pF	S	Styrol	J	+/- 5%	T	Tantalum	K	+/- 10%			L	+/- 15%			M	+/- 20%			P	+100% -0%			Z	+80% -20%
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M002	SKL227-2	FEET RUBBER 4 PCS																																																																											
M003	TBM2A30833	BADGE, PANASONIC																																																																											
M004	TBX1484900G	ASSY. 13 PUSHBUTTON																																																																											
M005	TBX8780500	1 PUSHBUTTON: POWER																																																																											
M006	TBX8780600	1 AUDIO/VIDEO IN-OUT BUTTON																																																																											
M007	TES2A20305	SPRING, DAG GROUND																																																																											
M008	TJS1A5081	CRT SOCKET																																																																											
M009	TKK69248-5	HANDLE, HOLDER																																																																											
M010	TLC2042-3	YOKE, CONVERGENCE																																																																											
M011	TMM2A30202	WEDGE, DEFLECTION YOKE																																																																											
M012	TQB510201-1	MANUAL, OWNERS'																																																																											
M013	TXFKU1994SER	ASSY, COVER BACK																																																																											
M014	TXFKY2494SER	ASSY, COVER METAL																																																																											
M015	TXF3A03TLR	ASSY, DAG GROUND																																																																											
M016	T8A262	SILCONE GREASE - HEAT SINK																																																																											
M017	0FMK014ZZ	CONVERGENCE CORRECTOR STRIP																																																																											
M018	0SX110206X	AC LINE CORD																																																																											
M019	37GDA85X(M)	CRT																																																																											

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